DOCUMENT RESUME

ED 271 200 PS 015 792

AUTHOR	Mandl, P. E., Ed.
TITLE	Universal Child Immunization by 1990.
INSTITUTION	United Nations Children's Fund, Geneva (Switzerland).
PUB DATE	85
NOTE	488p.
AVAILABLE FROM	Assignment Children, UNICEF, Palais des Nations, 1211 Geneve 10, Suisse ($2.50; 8.50 French Francs).
PUB TYPE	Reports - Descriptive (141) -- Collected Works - Serials (022)
JOURNAL CIT	Assignment Children; v69 n72 1985
EDRS PRICE	MF02/PC20 Plus Postage.
DESCRIPTORS	Agency Role; Case Studies; Communicable Diseases; Communication Skills; *Developing Nations; Foreign Countries; Guidelines; *Immunization Programs; *International Programs; *Program Implementation; *Public Health
IDENTIFIERS	Brazil; Burkina Faso; China; El Salvador; Indonesia; Smallpox; Turkey; Uganda; West Africa

ABSTRACT

The present volume endeavors to highlight the deeper significance and broader implications for development theory, policy and practice of the realization of the movement toward universal child immunization by 1990 (UCI-1990). Simultaneously, the volume collects and analyzes the most significant findings and experiences of the movement since 1984. After a prefatory essay discussing the breakthroughs in supply and demand that have allowed nations to double or triple their immunization rates, the introductory essay reviews the debate within UNICEF concerning the Child Survival and Development Revolution (CSDR). Subsequent papers focus on (1) the CSDR and development theory; (2) the costs of UCI-1990 in wider perspective; (3) operational issues related to UCI-1990; (4) lessons learned and questions raised since 1984 concerning UCI. Other materials report pledges and resolutions made by leaders and organizations about participating in the CSDR and related programs. Providing guidelines for action, other materials describe eight diseases and their vaccines and explore planning principles for accelerated immunization activities; the potential role of Red Cross and Red Crescent Societies in national immunization programs; criteria for funding polio immunization programs; and channelling, a new immunization strategy. The resolution of the Red Cross and Red Crescent Societies on immunization is reported. Concluding materials focus on lessons learned from the smallpox eradication campaign; case studies on immunization in Turkey, Burkina Faso, West Africa, Uganda, China, Indonesia, Brazil, and El Salvador; and research notes discussing the epistemology of traditional health theories, communicating about immunization to mothers and community groups, and how mothers in Honduras perceive immunization. A brief glossary of terms related to immunization is provided. (RH)

ASSIGNMENT CHILDREN

A JOURNAL CONCERNED WITH CHILDREN
WOMEN AND YOUTH IN DEVELOPMENT

ED271200

Universal child immunization by 1990

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A multidisciplinary journal concerned with major social development issues, with particular reference to children, women, and youth.

Published by the United Nations Children's Fund

***Assignment Children* appears in French under the title**
Les Carnets de l'enfance

Library of Congress catalog card number : 68-377

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Editor
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UN ISSN 0004-5128

Assignment Children
UNICEF, Palais des Nations,
1211 Genève 10, Suisse, tél. (022) 98 58 50

assignment children

69/72 1985

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Editorial

Accelerated immunization programmes and CSDR: their meaning and broader implications for development

P.-E. Mandl

To celebrate the 40th anniversary of UNICEF, this volume of Assignment Children is devoted to universal child immunization by 1990 (UCI-1990).

This emphasis is indicative of the very real new opportunities to increase nation-wide immunization coverage. At the same time, it is also indicative of the wider potential breakthroughs taking place in the sphere of development through accelerated immunization programmes, which might positively affect and indeed accelerate other basic services as well as other programmes nation-wide in other sectors. Because accelerated programmes are so recent, their wider implications are only now starting to be analyzed.

In 1984 and 1985, there has been an acceleration in the social history of vaccination that is unprecedented since the discovery in 1796 of Jenner's vaccine, which was to spread around the world within a decade.

The prevention of six childhood diseases by immunization, a conventional public health measure, is today being transformed into a national and international social movement, with far-reaching consequences. Not only will the success of UCI-1990 help to reduce infant morbidity and mortality in a measurable way, but the experience of massive public participation may also *contribute to creating a new climate, a new ethic, and new economic and administrative conditions favourable to achieving many other development goals, not limited to the health sector alone.*

The present volume endeavours to highlight the deeper significance and broader implications for development theory, policy and practice of the realization of UCI-*1990 through accelerated immunization programmes.*

At the same time, it represents a major effort to bring together and analyze, for operational purposes, the most significant findings and experiences since 1984, and thus to be of direct use to those involved in planning and implementing accelerated programmes to achieve the UCI-*1990 goal.*

Over 60 countries are now in the process of dramatically increasing or are planning to increase their immunization coverage nation-wide, and others are constantly being added to this list. Only a few years ago nobody would have believed that the 1990 goal could be reached, or that nation-wide immunization coverage does not need to await economic development.

In his Preface to this volume, James P. Grant, Executive Director of UNICEF, *focuses on the two breakthroughs which, over the past two years, have allowed a number of nations to double or treble their immunization rates. The first is the supply breakthrough, brought about by the development of more thermostable vaccines, improvements in the cold chain and in the training of health workers and immunization teams. The combination of these has permitted more effective outreach strategies.*

The second is the demand breakthrough which is of equal importance. It has been brought about by political will leading to the involvement of all branches of *government, the mobilization of all levels of society, and the use of all conventional and non-conventional channels of communication.*

The use of all forms of social communication for immunization has far-reaching effects that go way beyond the utilitarian message of when and where to take one's children for immunization.

Marshall McLuhan stated many years ago that the medium is the message. Health messages are usually not preached from the pulpit of a church, by the imam in a mosque, or transmitted through the political party system. In so being conveyed, however, immunization messages gain in credibility by association with the moral authority and ethics that these channels carry, whether religious (Colombia, El Salvador, Turkey) or revolutionary (Burkina Faso). The active support of religious or political institutions in implementing CSDR and immunization programmes through their existing outreach structures adds further strength to the moral arguments of the messages. Furthermore, in the Third World, television, radio and the printed press do not usually devote as much time and space to health matters as they have done recently in a number of countries for immunization. This broad and ongoing support confers public importance on its value as a life-saving measure. The administering of immunizations by heads of state and governors, broadcast nation-wide, bestows further significance on the importance of immunization and legitimizes it as a public good, which is then reinforced at the local level by village authorities and village health committees. As a result of these mutually reinforcing factors, the motivation of parents for having their children immunized is ten-fold increased, and decades of slow conventional health education are achieved nearly overnight.

The increased conviction in the feasibility itself of the concept of "protecting one's children", with its underlying ethic shared by all groups of society, not only leads to massive public participation and to parents demanding immunization for their children, but also creates new conditions for accelerating other child protecting measures, which empower families in their daily health-related activities. While immunization itself will not affect some major causes of neonatal mortality, the climate created by successful accelerated programmes will greatly facilitate the adoption by parents of simple life-saving measures such as ORT, *hand-washing, etc. Thus, accelerated immunization programmes can become a leading edge for the expansion of other* PHC *components at a cost which is affordable to both industrialized and developing nations.*

In the Introductory essay, Varindra Tarzie Vittachi, Deputy Executive Director for External Relations, UNICEF, *New York, shows that strong debates have occurred at each stage of the evolution of* UNICEF, *starting with its creation and then each time that its mandate and its policies have been expanded. Such debates, as the present one surrounding* CSDR, *serve to clarify and ensure its progressive course while, however, at the same time drawing away time and energy from the main purpose: survival and growth of children. In questioning* UNICEF'S CSDR *approach, there is too often a failure to distinguish between means and ends, and in particular a failure to recognize that immunization while being a valuable end in itself, is simultaneously also a means for enabling people who have understood and appreciated its benefits for their children, to renew such an effort in other areas for different goals.*

Other debates derive from a theology of orthodox development. Bottom-up programmes versus top-down *programmes or horizontal versus vertical structures too often continue to be discussed within reified or static problem approaches which do not take into account the changes that have occurred over the past two years in CSDR and accelerated immunization programmes. The real issue is demystifying and disseminating the knowledge and know-how held at the top and melding it with traditional knowledge and the wish of parents to protect their children against disease and death, thus empowering the people with a know-how they value. Similarly, the current argument against campaigns is based on campaign structures of the past and on doubts about their sustainability. To reject the campaign strategy out of hand is to overlook the added and new dimensions of the more recent immunization campaigns: the permanent value of social mobilization, the value of heightened public conscientization, the understanding by the people themselves of the value of the immunizations offered, as evidenced by their unprecedented attendance at vaccination posts and the resulting high immunization rates. Finally, critics of the new campaign approach neglect the value of the massive participation of the Church and other religious groups, NGOs, trade unions, which represent integral and powerful dimensions of the social structure without whose willing involvement social change cannot be sustained.*

How do CSDR and accelerated immunization programmes in particular relate to development theory and development policies? The first two articles of the Dossier further address this question.

Karl-Eric Knutsson, Deputy Executive Director for Operations, UNICEF, New York, opens the Dossier. Through CSDR and accelerated immunization programmes, UNICEF is involved in a process which implies fundamental changes in development theory and practice.

The usual concept of development conveys ethnocentric and central power biases as well as a fragmented and sectoral approach to reality. Accelerated immunization programmes nation-wide represent an example of action within a new development paradigm. Experimenting with participatory or alternative development approaches only on a small scale—valuable as it is—is no longer enough. In reviewing CSDR approaches recently chosen by a number of countries, a very significant pattern is emerging. A few years ago, immunization was regarded as a highly technical issue restricted to the medical profession. Today, the issue has broken out of its institutional and technical imprisonment and all levels of society participate. At the policy level, the debate has shifted from the tools to the purpose and meaning, and from constraints to possibilities. At the action level, the focus has shifted from the technological aspects to its carriers. These changes, rendered possible by new techniques, have been user- and people-oriented. The criteria for a new development must be applied therefore not only to the techniques of immunization and its expected results, but also to the process of social mobilization for child survival, which addresses issues that are central to the right of freedom from disease without awaiting a lengthy process of economic development.

Although these programmes have been focused on the achievements of one selective set of purposes, a pragmatic selectivity to facilitate action, the analysis behind them has been profound and complex. They address not only symptoms, but also fundamental biological and knowledge-based causes of underdevelopment in the areas of health and survival. Although the deep causes of poverty are only marginally affected, such mobilization, addressing important goals of ordinary people in great numbers, can release their social energy and *increase their control over other aspects of their situations and make it possible to pursue other goals important to them. Do-ability, which characterizes accelerated immunization programmes, is not only a question of costs. At the end of an analysis, it is unethical to produce "non-do-able" propositions or ones which do not result in effective and relevant action with and for the poor and vulnerable. Effectiveness becomes therefore closely linked to the ethical core of the new development paradigm and to the translation into practice of those principles.*

In the first part of his paper, Richard Jolly, Deputy Executive Director for Programmes, UNICEF, New York, discusses four common fallacies concerning costs and sustainability for achieving UCI-1990, suggests rules to be followed, and points to conditions for nationwide expansion.

For instance, costs are wrongly assumed to be fixed or unchangeable. Especially with regard to health services, costs per beneficiary often vary by a factor of 10. Average costs per person hide a diversity in approaches or in organizational structures which accounts for these differences. The analysis of cost variations should serve as a stimulus to research on how low-cost structures can become the model for expansion. Furthermore, the purpose of costing a project is too often limited: is it affordable? The real question is to search creatively for ways to satisfy a basic human need and to identify or develop programme approaches which can be afforded by all parties concerned and sustained over time. Different elements of a project or a programme design may need to be changed to achieve an affordable low-cost structure.

In addition, there is always more than one way of measuring costs, especially when considering the objectives of the project and the various costs from the *viewpoints of the parties involved. Finally, rather than assuming for the sake of objectivity, that all costs should be included, it is more important to examine how the different costs bear on the various groups at different stages of the project: initial start-up costs, long-run recurrent costs, foreign exchange costs.*

In the second part of his paper, Richard Jolly sets CSDR *and* UCI-*1990 in a wider perspective. In a decade of rising poverty, malnutrition and economic pessimism,* CSDR *represents an attempt to press dramatically ahead with low-cost, but high-priority health actions, focused on children. The real battle is for the universal application of low-cost approaches over the whole area of basic needs. The implementation of such strategies is economically even more difficult today, because resources are more constrained. The political significance of* CSDR *is that the very success of accelerated immunization programmes demonstrates that a broader range of such low-cost actions can be implemented. In turn, such low-cost effective approaches will have to be incorporated into the dominating part of policies concerned with balances of payments and with restructuring the economy: adjustment with a human face.*

In Assignment Children no. 65/68, 1984, Nyi Nyi, Director of the Programme Division, UNICEF, *New York, presented a step-by-step guide for action on going to scale on the basis of his own experience in Burma and other successful programmes which achieved nation-wide coverage. In the present volume, from the experience of recent accelerated immunization programmes, Nyi Nyi delineates some of their common characteristics and discusses some major operational issues that are emerging and which need to receive more attention if accelerated* EPI *programmes are to be efficient, effective and sustainable. Sustainability is a major concern and one of its neglected dimensions is* *the transition from mass mobilization and galvanized enthusiasm to an established system, along with a sustained consumer demand for immunization. Planning the accelerated immunization efforts as a leading edge and part of PHC is equally important, especially as the added dimension of social mobilization leads to a change in the social dynamics of the health sector. Costs, various levels of herd immunity as a strategic planning factor in reducing the incidence of diseases, identifying and reaching the unreached, represent other important operational issues. Finally, coverage rates represent only a measure in relation to a target coverage. The goal is the reduction in the incidence of the vaccine-preventable diseases. To assess it requires the appropriate data collection.*

In March 1984, WHO, UNICEF, the World Bank, UNDP and the Rockefeller Foundation hosted a conference in Bellagio, Italy. Its title was "Protecting the world's children: vaccines and immunization within primary health care". At the conclusion of the conference, they joined to form a Task Force for Child Survival. A follow-up conference (often called Bellagio II) was held in October 1985 in Cartagena, Colombia.

Stephen C. Joseph, UNICEF Special Coordinator, Child Health and Survival, discusses the lessons learned and questions raised since the 1984 Bellagio Conference. The diversity of approaches that can be observed in the countries which have massively accelerated their EPI efforts during the past two years indicates that there is not one unique approach. Social mobilization, which has led to the transformation of a health programme into a social movement, provides the vital link between EPI and PHC. Thus the recent campaign strategies differ fundamentally from other campaigns in the past as they develop a "positive programming momentum" extending beyond immunization. Other *lessons point to difficulties encountered which require creative solutions. For instance, production and distribution capacities of supplies other than vaccines may create bottlenecks. On the basis of the experience of these past two years, Stephen C. Joseph proposes seven characteristics of an accelerated* EPI *programme.*

*The Expanded Programme on Immunization (*EPI*) was established by* WHO *in 1974.* WHO/EPI *presents a global overview, starting with the origin of the programme, its development over the years, and the need more recently recognized for a major acceleration effort in order to meet the 1990 goal set in 1977 by the World Health Assembly. A new thrust to reach the 1990 goal was first recommended on 14 May 1982 in Resolution* WHA *35.31 accompanied by the* EPI *five-point action programme. With the assistance of* WHO *and* UNICEF*, new strategies are being elaborated by developing countries, such as national immunization days and campaigns based on social mobilization. Furthermore, the* EPI *Global Advisory Group, which met in Copenhagen in November 1985, recommended three general and four specific actions to be taken in order to meet the 1990 deadline, while continued efforts in other areas were also pointed out.*

The resolution of PAHO/WHO *on polio eradication in the Americas by 1990 and the resolution of the* WHO *Regional Committee for Africa declaring 1986 African immunization year, reproduced in this volume, bear witness to the will to reach this goal. A further significant manifestation of this will is illustrated by the pledges for universal child immunization made on 25 October 1985 on the occasion of the celebration of the 40th anniversary of the United Nations. The declaration of intent "We the peoples", signed by leaders of many nations and of non-governmental organizations,* *is reproduced in this volume. Replicas of the declaration continue to be signed world-wide.*

The six childhood vaccines included in EPI *represent a solid beginning. Vaccines are among the most cost-effective public health tools in history. Gustav J. V. Nossal, Director of The Walter and Eliza Hall Institute of Medical Research, closes this Dossier by discussing the biotechnology revolution, new vaccines, and ongoing research opening new perspectives.*

* * *

The section Guidelines for action weaves together the international and the national dimensions. A joint statement has been developed by WHO *and* UNICEF *on planning principles for accelerated immunization activities. Since policies in the field of immunization are evolving so rapidly, the intention is that they will be updated and revised as necessary. In view of its importance as a policy approach in the making, the joint statement is reproduced in this volume.*

Major international and national non-governmental organizations in increasing numbers are deciding to adopt UCI*-1990 as one of their priority goals. On 24 October 1985, the International Federation of National Red Cross and Red Crescent Societies passed a resolution inviting their National Societies to become more actively involved in the control of vaccine-preventable diseases through their participation in national immunization programmes, in coordination with* WHO *and* UNICEF.

How can these National Societies participate in national immunization programmes? What do they have to offer in terms of resources and expertise? How can they make a significant contribution? Bruce Dick, *Health Coordinator (Immunization) of the Child Alive Programme, and Andrei Kisselev, Under-Secretary-General, Health Division, of the League of Red Cross and Red Crescent Societies in Geneva, endeavour to answer these questions in a systematic manner, and present detailed planning guidelines for involvement in national immunization programmes.*

The Rotary Foundation of Rotary International has allocated over US$ 12 million to polio immunization programmes in 26 countries and has pledged to raise US$ 120 million within the next three years. On 14 May 1985, Rotary joined PAHO/WHO in the goal to eradicate polio in the Americas by 1990. As mentioned in various case studies published in Assignment Children, Rotarians have furthermore provided support to many recently accelerated immunization programmes in cooperation with governments, UNICEF and WHO. In this volume, the criteria for Rotary funding of polio immunization programmes are presented, along with suggestions on the potential role of national or area Rotary committees in supporting immunization days.

Both the Red Cross and Red Crescent Societies and Rotary International illustrate actions which are likely to be of relevance to other non-governmental organizations.

At the governmental level, Manuel Guillermo Gacharná Romero, Director of Epidemiology, Enrique Silva Pizano, Chief, Immunization Group and Jaime Avendaño Lamo, Immunization Group, describe the channelling strategy developed in Colombia which was briefly mentioned in the case study on the Colombian Vaccination Crusade of 1984, published in Assignment Children no. 65/68. Health workers and community leaders or guides conduct household visits to identify unvaccinated children and those with incomplete vaccination schedules to "channel" them to health centres or *vaccination posts. In the meantime, other countries have adopted this channelling strategy for immunization while in Colombia it is now also being employed for ORT and other PHC components of the Colombian Child Survival and Development Plan.*

The purpose of including in these Guidelines characteristics of eight diseases and those of the corresponding vaccines used in current WHO/UNICEF assisted programmes is to present the latest information in a single, easy to consult format, in a language accessible to non-health personnel involved in planning, programming and implementing accelerated EPI programmes.

The section on Lessons learned from the smallpox eradication campaign endeavours to re-read history with an action-oriented perspective. Two major books have been recently published on the history of smallpox: one in the USA, "Princes and peasants, smallpox in history", by Donald R. Hopkins, Assistant Surgeon General and Deputy Director, CDC, Atlanta, the other by Yves-Marie Bercé, "Le chaudron et la lancette, croyances populaires et médecine préventive (1798-1830)". On the basis of the very rich material presented in these two works, an attempt has been made to delineate the social dynamics and the process of social mobilization which took place in 1796 and the following years, to explain the extraordinary speed of the dissemination of Jenner's vaccine. Within a decade, it spread over the world, notwithstanding the Napoleonic wars, the blockade, and the difficult and slow communications of the time. It bears some resemblance to what has again been happening over the past two years: the perception of immunization as a common good and as an ethical value transcending political conflicts and vested local interests, involving all classes of society.

The article by John Z. Bowers (original title "The odyssey of smallpox vaccination—the Fielding H.

Garrison Lecture") provides an explanation at the technical level of how vaccine was transported by a human warm chain, long before the cold chain was developed.

In his article, Donald R. Hopkins, the author of "Princes and Peasants" mentioned above, highlights two important lessons of the smallpox eradication programme. The first lesson is that the discipline and enthusiasm of that campaign could be applied to an attack on several high-priority diseases or conditions simultaneously, to great advantage. The second lesson is that eradication of selected diseases remains a uniquely useful tool for advancing the public's health.

Stephen W. Jarrett, Senior Programme Officer, UNICEF, Beijing, analyzes smallpox eradication from the perspective of selected management issues which, too, have a bearing on today's accelerated EPI programmes. Although these management issues were critical for the eradication of smallpox, they have received little attention to date, pending the publication by WHO in the autumn of 1987 of the monumental work: "Smallpox and its eradication".

*
* *

The eight case studies examined in this volume represent different acceleration strategies undertaken under different conditions at the end of 1984 and in 1985. They highlight some hitherto neglected aspects of development. Development theory has long recognized that concerted action on the part of all sectoral ministries is essential to achieve long-lasting results, but such recommendations have not often been translated into practice simultaneously at the national, provincial and local levels. Concerted intersectoral action has mainly been observed at the local project level, in so-

called "integrated development projects", or at the national level of policy statement, but usually without effective intersectoral implementation at the district and local levels. The case studies show that simultaneous intersectoral cooperation at the national, provincial and local levels is feasible and has been successfully achieved. This first-hand administrative experience in accelerated immunization programmes provides a basis for other actions in different domains. The case studies illustrate the simultaneous operational relations at all three levels between the health ministry, other branches of government, and NGOs, in the implementation of accelerated EPI. A new dimension is added to the traditional management discourse which was essentially concerned with the strengths and weaknesses of vertical versus horizontal structures of EPI within the health ministry.

The Turkish campaign was designed to immunize some 5 million children in three 10-day phases, from September to December 1985, each four weeks apart. The case study by Münevver Bertan, Technical Coordinator of the Turkish national immunization programme, and Richard S. Reid, UNICEF Representative, Ankara, analyzes the three elements which were required to create a critical mass: social mobilization, manpower planning, and supply and logistics.

The sermon preached in all 54,000 mosques in Turkey on the evening of Friday, 6 September 1985, before the start of the immunization campaign, highlights a significant aspect of the social mobilization which occurred in Turkey.

The case study shows that in a well-prepared and well-implemented campaign, it is indeed feasible to obviate the risk of immunizing mainly the older children. In Turkey, the campaign successfully immunized more than 80% of the eligible children under 1 year of *age against measles. From its inception, the Turkish campaign was designed to incorporate in a sequential way at a later stage additional components, such as oral rehydration therapy and action against acute respiratory infections, which account for the highest proportion of child deaths in the country.*

How can an immunization campaign be carried out in one of the poorest countries of the world, with a literacy rate of less than 7.5%, which has less than 200 doctors and some 7,000 villages of which only 3,000 are served by health workers? The case study by the Ministry of Health of Burkina Faso and UNICEF, Ouagadougou, provides some significant answers which might be relevant for other countries with similar conditions. The purpose of Vaccination Commando, carried out between 25 November and 10 December 1984, was to avert further epidemics of measles, yellow fever and meningitis while at the same time preparing an acceleration of EPI and the extension of PHC nation-wide. In view of the restricted service access in rural areas, low literacy rate, weak communication infrastructure, and limited media outreach, the main communication channel and implementing institution (supplies, logistics, etc.) was the political structure: the Committees for the Defence of the Revolution, which replaced the previous political structures at all levels, assumed the responsibility for making the campaign work and for suscitating the necessary mass participation.

The most spectacular aspect of Vaccination Commando was the sensitization and mobilization of the people without the material possibility to rely on the mass media to the same extent as in other developing countries. At each level, national, provincial, district and down to the most remote village, the Committees for the Defence of the Revolution spread the immunization messages. Theatre forum performances in the *national languages on attitudes towards immunization and their consequences represented an important communication tool. Volunteers replaced the sketch, with their own solutions, thus ensuring true audience participation.*

Simplifying an immunization schedule primarily involves a reduction in the number of contacts necessary to ensure the protection of infants. It is particularly useful in countries with dispersed populations and limited access to health services in rural areas. Philippe Stoeckel, Director-General of the Association pour la promotion de la médecine préventive (APMP), Paris, has, since 1975, been directly involved in immunization programmes in West Africa based on a simplified immunization schedule. He discusses the type of vaccines suitable for use in a two-session immunization programme, the personnel required, and presents the most recent data on costs and results that are available.

China, with almost one-quarter of the world's children, has decided to accelerate its national immunization programme. This will is illustrated in the introduction of Cui Yueli, Minister of Public Health, to the case study prepared by Cao Qing, Deputy Director, Department of Epidemic Prevention, Ministry of Public Health, Stephen W. Jarrett, Senior Programme Officer, UNICEF, Beijing, Robert L. Parker, Programme Officer for Health, UNICEF, Beijing, Carl E. Taylor, UNICEF Country Representative for China, and Yang Baoping, Deputy Chief, Division of Acute Communicable Disease Control, Department of Epidemic Prevention, Ministry of Public Health. While in some areas immunization rates are already as high as 90%, the more mountainous and remote areas represent a great challenge requiring organizational skills, motivation and commitment of resources. The case study on China relates the *evolution of the country's immunization strategies, the plan for 1985-1989 and the revised plan for 1986-1990 addressing nation-wide cold chain coverage, vaccine production, integration of EPI with MCH, and financing of immunization services.*

Tetanus toxoid vaccination of women of child-bearing age is increasingly becoming recognized as an important measure in reducing infant mortality. A tetanus toxoid immunization campaign was carried out in West Nusa Tenggara in Indonesia from January to April 1985. The case study by UNICEF, Jakarta, describes the rationale and implementation of this campaign and discusses five major elements which contributed to its success, its shortcomings, the significant role played by women, and how this experience can contribute to improving the regular immunization services.

The Brazilian immunization experience is unique because of the size of the country, its population of 130 million and the non-conventional but highly effective mixed immunization strategy adopted. In Assignment Children no. 65/68, João Baptista Risi, National Secretary for Basic Health Activities, presented national polio immunization days begun in 1980, which, as a complement to routine immunization services, provide the only means of achieving nation-wide coverage. The decrease in polio incidence was unprecedented. In the present case study, written in collaboration with Roberto A. Becker, Director, National Division of Epidemiology and Ivanildo T. Franzosi, Coordinator, National Immunization Programme, the adoption only two years ago, in certain states, of mass simultaneous immunization during the national polio vaccination days, is discussed. The problems which had to be solved are highlighted and the latest results obtained in the areas where this strategy has been implemented are presented.

Cole Dodge, UNICEF Representative in Kampala, describes briefly the corridors of peace which were established in Uganda. Immunization efforts are usually hampered and often come to a standstill in a country at war or divided by civil war. In Uganda, UNICEF was able to succeed in persuading both sides of the civil war in the autumn of 1985 to allow the nation-wide immunization programme to carry on despite the conflict.

Rolando Hernández, Director, Division of Epidemiology, Ministry of Health, El Salvador, and Hernán Jaramillo, at the time Programme Officer, UNICEF, Guatemala, illustrate what can be achieved against the odds, when immunization of a nation's children becomes an accepted ideal transcending political conflicts. In El Salvador, both the government and the guerillas agreed that immunization should be taken to all parts of the country. As a result of the efforts of all parties concerned, the three national immunization days, held on 3 February, 3 March and 21 April 1985, were transformed into "days of tranquillity" as planned.

The Research notes focus on intercultural communication problems relating to immunization at the local level, which are of crucial importance. Very little research indeed has been published on how to communicate immunization concepts to parents in order to increase coverage rates and to create a real demand for immunization. In the past, research efforts were concentrated on the supply side (improved cold chain, vaccines, training of vaccinators) as if this were sufficient to make parents avail themselves of the services, should they be available.

If health messages conveyed by the mass media are to be reinforced at the community level and a demand for immunization created, mothers have to understand the causality of health protective measures in their own cognitive scheme.

Pauline O'Dea, former Assistant Programme Officer, UNICEF, Nairobi, points to the neglected area of traditional health knowledge in participatory research. An analysis of etiologies and of what people themselves perceive in different socio-cultural contexts as cause-related events in health and in disease is crucial to building a bridge between different types of knowledge, necessary in the long run for sustaining public health efforts.

Miriam K. Were, Chairman of the Department of Community Health, University of Nairobi, points to the need to identify common areas of agreement, to exchange views on causation in discussion with community groups and to submit the scientific view as "another explanation". The use of similes to convey major immunization concepts is illustrated by the banana leaf model which she used successfully with rural mothers in Kenya.

In Honduras, the lack of understanding by mothers of the concept of immunization and its practice, and in particular of vaccination cards, was an important factor in not bringing children to complete their immunization schedules. José Enrique Zelaya Bonilla, Chief, Division of Epidemiology, Ministry of Health of Honduras, José Ignacio Mata Gamarra, Field Project Coordinator, AED, and Elizabeth Mills Booth, Senior Programme Officer, AED, present a summary of the findings of their study, which resulted in a multimedia strategy including the design of a new vaccination card based on visual codes.

Preface

Universal child immunization by 1990

by James P. Grant

THE STATE OF THE WORLD'S CHILDREN 1986
United Nations Children's Fund (UNICEF)

The 1986 report looks at countries where, in the last 18 months, pioneering methods have succeeded in doubling and trebling immunization levels. Giving notes and quotes, facts and examples, statistical tables, and summaries of the latest research and writings on the low-cost methods, the report shows how a child survival and development revolution could be achieved.

The full edition of *The state of the world's children 1986* may be obtained from your local bookshop (hard-cover: £10.95, US$18.95; paper-cover: £3.95, US$8.95) or from:

Oxford University Press
116 High Street, Oxford OX1 4BZ, UK

Oxford University Press
200 Madison Avenue, New York, NY 10016, USA

UNICEF, 866 United Nations Plaza
New York, NY 10017, USA

Preface

Universal child immunization by 1990

James P. Grant
Executive Director
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When the concept of universal child immunization by 1990 was first advocated, it was widely believed to be an unachievable, utopian ideal. Yet, as UNICEF enters its 40th year of existence, world-wide developments indicate that the ideal is well on the way to becoming a reality.

Immunization coverage today ranges between 20 and 40% of the developing countries' children, despite the theoretical availability of vaccines to a much greater proportion of their populations.

However, in the last 18 months, several nations have doubled and trebled their levels of immunization against the vaccine-preventable diseases which were killing almost 4 million children a year and leaving another 4 million permanently disabled. Throughout 1985, world-wide demand for vaccine was approximately three times its 1983 level and the number of child deaths being prevented by vaccines is now estimated to be approaching 1 million a year.

This sudden acceleration in immunization coverage has been made possible, in large part, by new strategies for reaching a much greater proportion of a nation's parents than are normally touched by modern health services. These new outreach strategies, made possible by breakthroughs in both supply and demand, now offer a new chance to bring immunization to the vast majority of the world's children within the next few years.

Acting on this information, the secretary-general of the United Nations, in June 1985, took the unprecedented

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step of writing to the presidents or prime ministers of all 159 member states, drawing their attention to this new potential and asking for their personal support for the goal of immunization for all the world's children by the year 1990.

Several nations are already moving to within striking distance of that goal. As against an average of less than 5% immunization coverage of the children of the developing world only a few years ago, coverage rates against some or all of the vaccine-preventable diseases have recently been pushed to 60, 70 or even 80% in Pakistan and Turkey, in El Salvador and the Dominican Republic, in Burkina Faso and Lesotho, in Saudi Arabia and Zimbabwe, and in parts of India and China.

In all, over 40 nations, with approximately two-thirds of the developing world's children, are rapidly accelerating their immunization programmes and now have a realistic chance of immunizing almost all their young children by the year 1990.

The supply breakthrough

This breakthrough was brought about by more heat-stable vaccines, by more reliable cold chains, by continuing research and training, by the installing of more equipment and supplies, and by the growing numbers of health workers trained in the management and organization of immunization programmes. In the 1980s, there has been solid progress on all these fronts. The latest freeze-dried measles vaccines, for example, remain potent for up to three weeks even in tropical temperatures. Cold chains of refrigeration—based on kerosene, bottled gas, electricity, solar energy, or ice boxes—are now in place in most nations. Most important of all, many thousands of immunization teams have been trained and fielded since WHO launched the Expanded Programme on Immunization (EPI) in 1974. To date, almost 17,000 people from over 100 nations have been trained on courses sponsored by WHO and UNICEF, and many more have been trained by governments themselves. China alone, for example, has drawn on EPI programmes to train over 100,000 health workers in immunization management.

Today, vaccine technology has moved on to the point where a nation's ability to reach high levels of immunization coverage has become significantly *less* dependent on its level of overall economic development.

It has been commonplace for some years, for example, for oral polio vaccine to be administered by village health workers. But recent trials in Central and South America have shown that children can also be injected with vaccines—against DPT and measles—using disposable syringes in the hands of community volunteers, who have received only a few hours of well-designed training. Trials recently began in Guatemala with the "Ezeject" system of vaccination in which both vaccine and needle come packed together in a single-shot disposable plastic syringe. As yet, there has been no complete evaluation of this method and the syringe-needle-vaccine package is not in commercial production.

But in the last few years, more conventional kinds of disposable syringe have demonstrated their power to extend the outreach of immunization in settings as different as Brazil, the Dominican Republic, El Salvador, and Pakistan.

Technological developments of this kind are therefore making it more possible for other organized sectors of society, far greater in their outreach than the health services themselves, to become involved in extending immunization to all a nation's children.

The demand breakthrough

The second and equally important advance is the demand breakthrough by which many developing nations are now mobilizing, on a massive scale, to make immunization available in practice and not just in theory. And it is political commitment to new ways of reaching out to inform and support the *majority of parents* which now offers new hope for putting into practice other child protection strategies on a scale which is commensurate with the problem.

To bring vaccination to people, to inform many tens of millions of parents of the when and the where and the why of immunization, and to get many more millions of children to the right place at the right time on several separate occasions each year, is a massive organizational and communications task which usually far exceeds the capacity and the experience of over-stretched medical services. In most developing nations, those medical services reach only about 20 to 25% of the people and are inevitably more concerned with meeting demand than creating it.

For all these reasons, comprehensive immunization coverage has risen only slowly, often reaching only one in five of a nation's children, even when vaccination services have been theoretically available to the majority for many years.

Clearly, something extra is needed, some new dynamic, some new way of forcefully taking the world's most powerful public health technology off the pedestal of its vast potential and putting it to everyday work in a million villages and neighbourhoods.

Something special is needed. And that something special is what the nations which are now moving towards full immunization began to pioneer in the mid-1980s: political will and social mobilization.

Political will and social mobilization

Making universal immunization possible by no means makes it inevitable.

Only by involving millions of people in knowing more, and demanding more, and doing more about their own and their families' health can low-cost technical solutions such as ORT and immunization fulfil that potential.

To convert this new potential for universal immunization into the actual vaccination of all children, an act of galvanizing political will—by a nation's leaders—is the catalyst which is so desperately needed. As the secretary-general said in September 1985 in his report to the General Assembly on the occasion of the 40th anniversary of the United Nations: "The great endeavour to bring immunization to all children in the world by 1990 now seems capable of realization if there is a will to make the final effort".

In the last year and a half, some outstanding examples of that "will" have been seen in several nations of the developing world. They have been examples set by heads of state and government ministries, by health service administrators and primary health care workers, by doctors and nurses, by local government officials and civil servants, by the women's organizations and the youth movements, by the representatives of international agencies and of voluntary organizations, by journalists and broadcasters, by priests and imams, by teachers and students, by Red Cross and Red Crescent Societies and the Rotarians, by the private sector and the trade unions, and by many millions of parents.

In most if not all cases, the mobilization of a society's resources on such a scale and behind such a cause has been made possible by the decision of a nation's political leaders to put their own personal and political commitment, and their government's financial and organizational resources, behind the effort to immunize the vast majority of the nation's children. In El Salvador and the Dominican Republic, in Colombia and Brazil, in Turkey and Sri Lanka, in Burkina Faso and the Sudan, success so far has been made possible by a nation's leadership deciding on a goal which it could see was both dramatically important and realistically achievable.

The health services have provided the technology and the medical expertise for all these achievements. But that technology and know-how have been made available to 80% instead of 20% of the people because they have been fitted to the engine of social mobilization and geared to working through a whole range of organized resources with a "social reach" going far beyond the usual outreach of the health services themselves.

It was less than three years ago that UNICEF first articulated the possibilities that the combination of child protection techniques and communications capacities offered to empower families to better help themselves. It has been exhilarating to see how fast that potential has advanced. Colombia, for example, is a country which is pulling this whole group of ideas together. Colombia started on the immunization front. The key, of course, is the leadership needed from the top if all sectors of society are to be persuaded to participate. President Betancúr talked to the media, including the leading opposition papers. He persuaded the press and the radio and television stations to cooperate, and he recruited the Church and the Red Cross, the Rotarians, the Lions, schoolteachers in every village, businessmen, and all of his government ministries. Together, they set out to do what had never been done before in history—to fully immunize the great majority of the children of a country against five major diseases in one three-month period.

Catholic priests told their parishioners that if they were good parents they should take their children to be immunized; if they did not have young children, they could do good by taking someone else's children. On the first immunization day, the president himself administered the first vaccination; the two living former presidents followed him; the Archbishop followed them. The minister of health took his turn, as did other notables. In the provinces, all governors were involved, with responsibility for the effective functioning of 10,000 immunization points around the country.

Colombia provides an outstanding example of the use of communications. The results demonstrated how spectacularly we can communicate. The great majority of Colombian children have now been immunized. Similar techniques are being used in country after country, each tailoring the approach to fit its particular structures and cultures. Meanwhile Colombia is taking measures to ensure the sustainability of the immunization programme, through permanent changes in primary school curricula, establishing an annual census of all families with children, training all priests, and, importantly, to apply the lessons learned to the implementation of a multifaceted National·Child Survival and Development Plan. In short, progress in primary health care has been vastly accelerated and health has become not only a vital concern of many—and not just the health sector—but a social movement as well.

Three outstanding examples of similar approaches (Burkina Faso, El Salvador and Turkey) are discussed in detail in this issue of *Assignment Children*.

Immunization and primary health care

These extraordinary efforts are of course attended by a turbulence of concerns about their sustainability, about the complacency they may temporarily induce, and about their place in advancing the broader goal of more comprehensive and permanent primary health care services.

Sustainability is a legitimate worry. A change of government or of a key minister, a falling-off of interest by the media, a failure to educate new parents about the importance of immunization—any and all of these can mean a dwindling away of coverage rates and the sudden return of tetanus, measles, pertussis, or polio.

Another worry is that the boosting of immunization coverage to two or three times its previous level will be considered achievement enough. If that happens, then the idea of immunization for all will not be carried right through to the point where it reaches those who are the hardest of all to reach, those who belong to the very poorest 30% of society, those whose lack of money and time and information and confidence means that they are usually left in the margins of a nation's life, those whose children are most in need of that degree of protection against poverty which immunization can provide.

A third question mark over mass immunization asks whether such campaigns are merely a substitute for the more patient and less spectacular work of building comprehensive and permanent structures of primary health care.

In answer to these concerns, experience to date suggests that the cause of primary health care can in fact be significantly advanced through the involvement of health professionals in a major achievement for national development, through the pioneering of ways and means to bring a basic piece of health technology within reach of the majority, through the setting up of the necessary outreach structures, and through the involvement of the majority of the public in knowing more and doing more about their own and their families' health. It is for this reason that immunization programmes can serve both as an end and as a means of primary health care, achieving both immediate protection against specific diseases and the involvement of whole societies in the wider and longer-term cause of health promotion.

Such concerns deserve sustained attention. But after 20 years of vaccine availability, the denial of its protection to two-thirds of the developing world's children demands that something new must now be tried.

It would of course be preferable if there were enough fuel and roads and refrigerators and clinics and schools and health workers so that every parent knew all about immunization, lived within easy reach of permanent immunization services, received computerized reminders in the mail, and brought his or her children to be vaccinated at exactly the right time for each individual child. But that is to say nothing more than that it would be preferable if developing countries were not developing countries. And the sentence that *universal immunization must await economic development and the coming of a permanent health clinic to every village* is simply a sentence of unnecessary death and disability for many millions of today's children and for even more millions of those who are still to be born.

If immunization remains at today's levels, then polio, to take just one example, will paralyze for life approximately 2.5 million children over the next 10 years. In addition to the personal suffering, the process of economic development itself will thereby be deprived of the contribution of most of those children and of most of those upon whom they become and remain dependent. When a cheap and simple technology to prevent polio is already in our hands, it is neither humane nor economic to allow the disease to continue crippling over a quarter of a million children a year.

In the case of measles, the figures become unthinkable. At present levels of immunization coverage, a total of at least 20 million children are condemned to die over the next

10 years from a disease which can be prevented by a single injection.

There is no valid reason for further delay. And there is no pre-ordained reason why the developing nations should tread the same path to full immunization as was beaten by the industrialized world a generation ago. For like many of the other powerful low-cost basic health strategies available to the developing world today, immunization could become a contributing cause rather than an eventual consequence of economic growth and comprehensive health care. It is clear that there is a long-term connection between the mental and physical development of children and the social and economic development of their nations. And basic steps towards protecting the lives and health and normal growth of the young are therefore a slowly maturing but exceptionally high-yielding investment in economic development itself.

There are also shorter-term economic benefits. In the industrialized world, the immediate economic gains from immunization programmes have by now almost been forgotten. But to take the United States as an example, the present cost of immunization programmes against three of the common infectious diseases comes out at US$ 96 million a year. Without this programme, the cost to society of dealing with those three diseases (for hospital treatment and rehabilitation) would be at least US$ 1,400 million a year —meaning that approximately US$ 14 is saved for every US$ 1 invested in the immunization programme. Similarly, the United States is now saving US$ 500 million a year on measles treatment—for an outlay of only US$ 50 million a year on preventing measles by immunization programmes. According to William Foege, former director of the Centers for Disease Control, Atlanta, and now head of the international Task Force for Child Survival: "The return on such an investment in the developing world, where morbidity and mortality for measles are higher, would be even greater... A preliminary analysis of vaccine programmes in the Ivory Coast, for example, suggests the benefit to cost ratio may well exceed 20:1."

External resources

Overall, the developing countries themselves are providing over 80% of the resources for their immunization programmes.

In the industrialized world, the commitment to world-wide immunization has so far, and with a few honourable exceptions, been modest. An exception large enough to demand acknowledgement is the US$ 100 million allocated in 1985 by the Government of Italy as a special contribution towards "saving the lives of 1 million children".

The total amount of aid being provided by the governments of the industrialized nations for all health services in the developing world is only about US$ 4,000 million a year—the equivalent of about two days' military spending. And of that, only about 20% goes to mother and child health services, including immunization.

By contrast, many private groups in the industrialized nations are heavily and generously involved in contributing towards the goal of immunization for all children by 1990. To mention another particularly outstanding example, the 1 million members of Rotary International have committed themselves to paying for all the vaccine required in any polio campaign in any developing country over the five years from now until the year 1990. The total cost of Rotary International's "PolioPlus" campaign could be in the region of US$ 120 million; the total benefit could be the prevention of more than 1 million cases of paralytic poliomyelitis. In many industrialized countries, National Committees for UNICEF and other non-governmental organizations are also working to help raise funds—and awareness—to support the goal of immunization for all the world's children by 1990.

There are perhaps two main reasons why the governments of the industrialized world might wish to consider a much greater level of support in order to help realize this new potential for universal immunization.

The first, and most important, is that the immunization of all children remains one of the greatest of all humanitarian goals.

The second is that it would also result in very significant economic gains for the industrialized nations themselves.

Evidence for this is to be found in the annals of the international campaign to eradicate smallpox.

In 1967, smallpox killed an estimated 2 million people. In 1977, the last case of smallpox was recorded in Somalia. The cost of the eradication campaign was approximately US$ 24 million a year, of which about one-third came from the developing countries themselves. For the duration of the programme, the USA contributed a total of US$ 32 million (in 1970 dollars). Since then, the Government of the United States of America has been able to discontinue smallpox vaccination and dismantle its elaborate quarantine and surveillance systems—which were costing approximately US$ 120 million a year in today's terms. In other words, the eradication of a major disease has meant that the USA is now saving *every few months* more than the total amount it invested in the eradication programme itself.

As we have already mentioned, the USA is today spending approximately US$ 50 million a year on vaccination and routine surveillance against measles and will continue to do so for as long as measles is at large in the world. A successful eradication programme would therefore save the USA US$ 50 million a year—every year from now on.

The humanitarian case for immunizing all children is beyond all question. The technology for immunizing all children is readily available. The cost of immunizing all children would be repaid many times over for both industrialized and developing nations. And the all-important organizational and communications capacity for reaching out to create and meet the demand for immunizing all children, has been shown to be within the power of those nations with the will and commitment to do it.

In the process, important strides could be made towards primary health care for all and new ways could be opened up for putting other pieces of vital health knowledge and other low-cost technologies at the disposal of the majority of the people.

If that can be achieved, and if, in the process, health care can come to be seen not only as passive recipience of services when sick but as active and informed involvement in the daily process of staying well, then the technologies and the knowledge now available are cheap enough and manageable enough for parents themselves to bring about a revolution in child health and cut by at least half the rate of malnutrition, infection, and death among the children of the developing world.

1945-1985
40 Years of
United Nations
Service to the World

UNICEF: The Children's Fund of the United Nations

Resolution by the Executive Board of UNICEF
on observance of the 40th anniversary of the United Nations
proposed by Bangladesh
passed on 25 April 1985

The Executive Board,

reaffirming its commitment to the principles and objectives of the Charter of the United Nations;

taking note of resolution 39/161(A) of the General Assembly on the observance of the 40th anniversary of the United Nations;

1. **urges** that special attention should be paid to the well-being and interests of children, future citizens of the world, in connection with the observance of the 40th anniversary and that all countries should continue to attach high priority to the needs and development of children as integral elements of national plans and policies;

2. **draws** the attention of world leaders to the importance of reaffirming on this occasion their increased commitment to accelerating the implementation of the Child Survival and Development Revolution and achieving universal immunization by 1990 with the objective of reducing dramatically the number of deaths among children from preventable causes;

3. **requests** that the Declaration to be adopted by consensus on 24 October 1985 at the end of the commemorative session include reference to these important goals and objectives for the welfare of children;

4. **also requests** the Executive Director to bring the contents of this resolution to the attention of all concerned.

Letter from the secretary-general of the United Nations to heads of state concerning universal child immunization by 1990

THE SECRETARY-GENERAL

10 June 1985

Excellency,

As we observe the 40th Anniversary of the founding of the United Nations, I should like to commend to your personal attention the contents of the enclosed resolution that was adopted unanimously by the UNICEF Executive Board at its recently concluded session.

The resolution articulates the possibility of achieving the goal of universal immunization of young children by 1990, through accelerated action in line with a goal already established by the World Health Assembly. The endeavour could result in saving the lives of several million children each year and in preventing a comparable number from suffering permanent disabilities.

Experience in several countries, some of which have doubled or even trebled their immunization rates in the recent past, has already shown that mobilizing a society's organizational and communications resources in support of an effective national immunization programme can have the most far-reaching cumulative effect. In particular, it can lend momentum to other primary health care approaches as supported by WHO and UNICEF. While much work remains to be done before the goals of the resolution are finally achieved, I am convinced that their reaffirmation in 1985 could have a significantly positive effect and I attach a brief background paper that elaborates this point.

With these considerations in mind I should like to express my hope, Excellency, that under your personal guidance your Government will reaffirm its commitment to these objectives in its statements during the 40th session of the General Assembly which will be held later this year. I am convinced that your leadership, in concert with that of other heads of government, would advance these most important efforts for the well-being of our children and the future of the world.

Please accept, Excellency, the assurances of my highest consideration.

Javier Pérez de Cuéllar

Introductory essay

CSDR: the dialectics of survival and development

by Varindra Tarzie Vittachi

Controversy

CSDR: the dialectics of survival and development

Varindra Tarzie Vittachi
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An instructive feature of the prolonged debate on the Child Survival and Development Revolution (CSDR) launched by UNICEF in 1983 is the resilience of the counter-revolution. As each head of the argument against the proposition is scotched by the logic of experience, a new head grows, demanding attention. A great deal of time and energy is thus drawn away from the main purpose—the survival and growth of children. But the struggle between momentum and inertia, action and reaction, is inherent in human relationships and, therefore, the continuation of the dialectical process is essential to any movement, to clarify and ensure its progressive course. The counterthrust should not be ignored or bypassed. It must be parried and not only deflected, but challenged forthrightly, lest it build up behind the movement into a garrison of discontent undermining and threatening the gains made.

Debates in the past

A separate agency for children

In this sense, the persistence of the debate, indeed its very existence, is a measure of the validity and viability of Child Survival and Development programmes. The history of UNICEF shows that at each stage of its evolution a similar dialectic, as vociferous, insistent and acerbic, was continuing throughout. The earliest subject of contention was the establishment of a

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separate intergovernmental agency to care for children. It was argued, with considerable force and reason, that the new specialized agencies then being created were the proper repositories of the world's obligations towards children. The Food and Agriculture Organization (FAO) would be responsible for children's food, the World Health Organization (WHO) (as the successor to the Health Division of the defunct League of Nations) for health for all, including that of children, the United Nations Educational, Scientific and Cultural Organization (UNESCO), for education. UNRRA, the United Nations Relief and Rehabilitation Agency would, as it was already doing, attend to the survival needs of the war-blasted children of Europe. The case for an agency to look after the special needs of children and adolescents (i.e., young people under the age of 18) was vehemently opposed. It prevailed essentially because Ludwik Rajchman, ex-President Herbert Hoover and others made a powerful plea for a *temporary* institution to deal with the *temporary* needs of victimized children of war.

A new role for UNICEF in 1950

The second great debate was in 1950 on the liquidation of UNICEF on the clear ground that its temporary life had run its course, and that since Europe and Japan were now getting back on their feet, they were able to take on the responsibility of looking after their own children without any "foreign" assistance. This viewpoint prevailed until Ahmed Bukhari, the Pakistan delegate, made an eloquent speech which argued that although the "temporary" European emergency of children of war was coming to an end, there was the "permanent" emergency of the children of poverty. (This was the forerunner of the current UNICEF terminology distinguishing "loud" emergencies and "silent" emergencies.) The new notion of a "development" agency for children was bitterly resisted even by some of those who had sponsored UNICEF's birth. Children as the object of charity, plain and simple, was an appropriate, virtuous and time-proven concept — UNICEF was expected to remain as the Milk Agency; "development"—changing the conditions in which children could grow to their full potential, was much too ambitious and expensive an undertaking, and besides, such responsibilities belonged to already established agencies specialized in developing the infrastructures necessary for social and economic change. (The infrastructuralists were to prove themselves to be a die-hard species, mutating and reappearing at various stages of the evolution of development theology.) Ahmed Bukhari's speech served as the pivot on which the majority at the General Assembly turned around and voted to give UNICEF a new and different lease of life—perhaps the only known occasion when an assembly of nations changed its mind-set in response to an argument.

Early campaigns and the role of UNICEF

An intense debate also occurred very early in UNICEF's life over the decision by Maurice Pate, strongly supported by children's health activists on the Executive Board, such as Ludwik Rajchman of Poland and Robert Debré of France, to launch campaigns against yaws, malaria and tuberculosis. It was loudly and frequently argued that such programmes were too heavy for UNICEF's small budget of around US$ 20 million; that vaccination and mosquito control were outside its proper mandate; that UNICEF as a "fund" was not an executing agency and should therefore confine itself to procuring and supplying penicillin, BCG and DDT to governments rather than engage actively in vaccination drives; that efforts to reduce the morbidity and mortality among children—including immunization—depended on the capacity of governments to set up the infrastructures to regularize and "sustain" health delivery action; and that UNICEF's task, as an intergovernmental fund, was not to press countries for better health for children but to be "responsive" within its means, to the "requests" of governments. The obsequious and virtuous sounding alibi: "UNICEF has no programmes; governments do" originated there.

These arguments were selectively—and more successfully—also used to keep UNICEF out of schools and curriculum-making and confined to supplying teaching materials for pre-schools and for "non-formal" education.

It took considerable courage and dedication on Maurice Pate's part as the head of a small voluntary agency dependent for its own survival and continuity on the yearly munificence of rich countries (some of whom were vocally opposed to the activism he was showing) to persist in going beyond the "supply" function, to take UNICEF assistance into the villages of recipient countries. This persistence carried into "the field" by Robert Debré, Raymond Mande, Sam Keeny, Alice Schaffer, Gertrude Lutz and other early activists, backstopped by the meticulous and tireless management in New York, of E. J. R. Heyward, his chief of staff and deputy, paid off handsomely. The campaigns against yaws produced handsome returns. In little more than a year yaws was put to rout, tuberculosis began to yield and the anopheles mosquito was in retreat to DDT.

Yaws was not totally eradicated and has returned in a few areas; tuberculosis which was a familiar blotch on the health scope a generation ago has not disappeared but is no longer the killer it was and BCG, the use of which was intensely controversial 35 years ago, is once again the subject of health policies (should it remain as part of children's immunization programmes or should it be struck off the list and used as a "reserve" vaccine?). The malaria mosquito has mutated, multiplied and returned to the attack, apparently vindicating the argument of the opposition of that time that it is uneconomical to drain the swamps to get at the alligators. (Cuba and North Korea have done just that and eliminated malaria but they have drawn fire by impugning orthodox health doctrines which maintain that their experience is not replicable.) The new weapon against malaria is to be a vaccine if the always imminent breakthrough succeeds. This time the aim is to thwart the protozoon rather than the vector.

The GOBI-FFF proposals

The most recent of the series of debates on programme evolution was triggered by the GOBI-FFF proposals promulgated in September 1982 following a seminal meeting between UNICEF and specialists in child health and development. There was an immediate flurry of dissidence accompanied by some wringing of hands and wagging of heads about UNICEF changing its programme base from "development" to "survival" and from "prevention" to "cure". The fact that oral rehydration therapy (ORT) was the only curative element represented in the mnemonic and that growth monitoring, breast-feeding, immunization, food supplementation (particularly relating to pregnant and lactating women, and weaning), family spacing and female education (this last was added on soon after the first announcement of GOBI-FF) were indisputably preventive and developmental in the essential sense that they improved the conditions in which a child was raised, did not allay the widespread suspicion that UNICEF was arbitrarily changing its programme content and direction. Nor did the factual argument that none of these elements were new to UNICEF's traditional programmes prevail. The clustering of these elements and the emphasis given to them—particularly the GOBI quartet, were seen as clear signs that the development dimensions of the programme—such as water and sanitation, income generation for women, appropriate technology, community food production, training and basic health services—were being jettisoned for new and rather flashy panaceas. This impression was further strengthened by the extent of media interest in *The state of the world's children* report and the promise of the GOBI proposals as a practical and inexpensive way for governments of developing nations to reduce their child death rates drastically if they would only put their minds to it. The interest aroused in the media was regarded not as an advance in popular participation but as a debasement of UNICEF's high purpose brought about by employing those accursed "Madison Avenue techniques".

These criticisms were met by widening the GOBI concept to include country-specific situations which called for interventions against malaria and acute respiratory infections which are also active child killers, and enlarging water and sanitation programmes as well as women's literacy and community participation activities as entry points for health education to empower parents with the knowledge they needed to be active participants in the accelerated health programmes rather than passive recipients. The GOBI-FFF concept was given a new rubric—the Child Survival and Development Revolution—which powerfully restated and drew together the objectives of the accelerated programmes. The D in the CSDR was a guarantee given to allay the fear expressed by some that UNICEF was abandoning its long-term development efforts. This served to put some minds at rest but the criticism flared up again when UNICEF, encouraged by the rapidity and enthusiasm with which Brazil, China, Colombia, India, Indonesia, Nigeria and Pakistan with their enormous populations were attaining impressively wider immunization coverage, picked up the challenge offered by the 1977 pledge of the World Health Assembly to attain universal immunization by 1990 as a priority thrust of the CSDR. The charge this time is that UNICEF is becoming too narrow in its purpose, and UNICEF finds itself, ironically, having to take the posture of "defending" GOBI-FFF against its erstwhile critics. The fact that not one penny has been cut from allocations for water and sanitation, women's activities and other now "traditional" programmes, makes no difference to the vehemence of the counter-revolution.

Ends and means

This brief foray into history is intended to provide a perspective of the continuing debate about and around UNICEF's evolution as the agency for the world's children. The tension it often arouses seems to be as much an index of the variegatedness of the perceptions about UNICEF's purpose, as it is of the way UNICEF springs forward into its future.

However, it needs saying that some "dissident" aspects of the debate are not constructive and progressive. They are caused more by poor internal communication and consequent confusion and are therefore retrogressive. There is a far too frequent failure to distinguish means and ends—a common enough deficiency in most human relations—but, what is worse, is the failure to recognize that some means are ends in themselves, one reinforcing the other. For instance, breast-feeding is an important means of protecting children against infection but it is also an end, a "good" thing in itself as any mother who has nursed her babies will testify. Family spacing is a means of giving a mother the time to recover her strength between pregnancies; it is also a "good" thing in itself. Female education is a means through which the demand of mothers for access to health care is stimulated by understanding; it is also a "good" thing in itself. Oral rehydration therapy is a "good" thing in itself because families which know and use it are more self-reliant, freer of the hospital syndrome and the expensive recourse to the intravenous bottle. If this dual nature of some of the means used in the CSDR is more widely appreciated, the charge that UNICEF's objectives are being frequently changed would lose whatever superficial appeal it has.

But, even more important, is the need to recognize the reality that ends have a natural way of turning into means for a farther end in the evolutionary process. For example, an immunization drive which achieves 80% coverage—the desired end of reaching a level which brings the unvaccinated population under the protection of the so-called "herd effect", is also the means of establishing a salient which facilitates farther the expansion of a health infrastructure capable of consolidating the gains made and extending immunization services to the new crop of babies being born each year.

The value of social mobilization

Perhaps the most instructive lesson of the experience of accelerated immunization drives is the value of social mobilization. The process of galvanizing and drawing in all of a nation's resources to conscientize the entire population about the possibility of bringing about an immediate improvement of the lives and prospects of children, is a powerful end in itself. It is also a tremendous permanent asset—a means—for enabling other development programmes to take root and flourish in a relatively brief period because the people who have understood and appreciated the benefits for themselves in such an effort through active involvement in a total national effort, are much more receptive to the introduction of ideas and programmes relating to family spacing, literacy, environmental sanitation and the like which carry a promise of further improvements in their family lives. This is the pragmatic basis of sustainability. It is also the vindication of the "demand approach" to development as distinct from the outmoded "supply approach" to development which was a disguised continuation of the old colonial attitude that the power elites exclusively knew best what people needed and failed to create the environment in which people would be actors in the daily drama of their own lives rather than mere spectators or "beneficiaries" of putative development boons.

In terms of scaling up on universal child immunization (UCI) a sustainable system of health care is also an end as well as a means. It is not only a product brought about by the day to day attention to the programme minutiae by a health ministry and the administrative structure, but a phase in a continuing process of health maintenance. When scale has been attained through accelerated drives, the means such as social mobilization used to reach higher levels of immunization also need to be sustained, not, of course, at the same pitch of intensity but sufficient to keep public attention on the continuing need to protect children until the people's demand for health services becomes internalized and assimilated as a part of their habitual cultural practices. At this stage the demand for better child care services and the ability and willingness of the administration to supply it, fuse into a national ethos of care and nurture the most powerless beings in a country—an undeniably desirable end in itself.

Orthodoxy, change and heresy

A characteristic of the dialectical process in development is the tendency on the part of the reactive force to immure itself in theological ramparts defended by spiky semantic embrasures. In these redoubts even the most progressive ideas are soon transformed into orthodoxy which perceives the merest suggestion of change as heresy.

Thus, the undeniable success of Cuba in reducing infant mortality to "developed" country levels through total immunization and by eradicating most infectious diseases, is minimized on the ground that it was not achieved by primary health care and recourse to paramedical personnel, but by a nation-wide system of clinics manned by MDs. The fact that Cuba has a glut of trained doctors—despite the massive emigration to the United States—and that their skills were available for deployment in the rural areas unlike in many developing nations, was discounted as irrelevant on the ground that it was unreplicable and expensive. That may well be so but the reality is that the Cubans did not set out to be exemplary or to be theologically virtuous but to respond to the health needs of the people with whatever means that were available.

Thus, the experience of Sri Lanka which succeeded in three decades in bringing infant mortality down from 180‰ to the low 30s was widely attributed to the prescience of its health ministers in taking the primary health care approach long before Alma Ata sanctified it. They did nothing of the sort. The health achievements of Sri Lanka were not due to rural community health infrastructures serviced by paramedics but to a high female literacy rate, malaria eradication and a country-wide system of central, district and cottage hospitals staffed by trained doctors. The introduction of community health nurses and other "basic" services is a relatively recent phenomenon.

This is not to deny the essential value of primary health care as an appropriate methodology for developing countries to attend to rural health needs. It is very much in harmony with the "demand approach" adopted by UNICEF, it is pragmatically feasible and also ethically becoming because it makes health services accessible and reduces its practitioners to human size. The point made is that doctrinaire measurements of appropriateness often obfuscate the reality that life is not about either/or but about and/and. "A bit of both" is what the doctor ordered.

Top-Down and Bottom-Up programmes: other dimensions

Another semantic dispute of a similar order which was intended to throw CSDR off the track was the issue of Top-Down versus Bottom-Up programmes. This has been a hardy perennial in all development debates. The advocates of the Bottom-Up posture claim an exclusive rectitude and cloak themselves in virtuous democratic sentiments which elevate popular wisdom to a shining pedestal while burning the government's health hierarchs in effigy. The evident truth, of course, is that like all demagoguery, this is unreal and dangerous sentimentality. It is not a question of Top-Down or Bottom-Up but one of demystifying and disseminating the technical knowledge accumulated at the top, and melding it with traditional indigenous knowledge and the wish of parents to protect their children against disease and death, thus empowering people at the bottom of the social scale with the information and understanding it takes to appreciate the benefits to them of personal and environmental hygiene and sanitation, of immunization, of ORT and of regular interaction with the health nurse so that this awareness is woven into the fabric of their habitual daily lives in a new pattern of attitudes and behaviour. Information intended to transform social and personal conduct needs to be assimilable and palpably valuable for people to accept and internalize it. For instance, the concept of immunization, ancient as it is in ayurveda and other traditional knowledge systems, is difficult to understand, as Jenner found when proposing vaccination against smallpox to "modern" Europeans. People habituated to ascribe such accursed diseases to inflictions of an ineluctable Fate are reluctant to accept the notion that infecting a healthy body with a disease now, in order to protect it from being overwhelmed by the same disease later, was more rational than taking their chances with the spiritist forces which customarily governed the events of life and death. Prevention, being less spectacular than cure, demands repeated experiential proof of its efficacy before it is commonly deemed to be useful. A king may strike a new coin with his royal face embossed upon it, but it will not become common currency unless people give it value—in-use and pass it from hand to hand. It is so with information. Wherever it originates, at the Top or at the Bottom, it will spread only when it moves horizontally—from family to family, from village to village in a process which bureaucrats may dub Technical Cooperation between Developing Communities.

This has also been the experience of programmers in the field of population who have taken a long time to understand that supply does not create demand. The blandishments they have used such as rainbow-hued condoms and monetary inducements for poor people to accept sterilization and contraception as a habitual way of life have not been as effective in reducing family size as the increased appreciation among people that they no longer needed insurance-size families to be fairly certain that the children they already have are likely to survive. The most efficacious contraceptive, it seems, is the reduction of child mortality. It has been hard for "population control" zealots to realize that the problem of unbridled population growth will not be solved in the uterus but in the human mind.

The value of "campaign" strategies as part of a process

The ongoing argument against the value of the "campaign" strategy in accelerated child survival programmes is premised on an overriding concern for "sustainability". National campaigns are seen as flashes in the pan or brush fires which sputter out as soon as the excitement generated at the centre dies down and life returns to a work-a-day normality. This may well be so, and some past experience, particularly with literacy campaigns, supports such scepticism. As WHO points out, it could indeed be wasteful and even counterproductive to launch public campaigns without due consideration and attention to sustainability. But to reject the campaign strategy out of hand as a heresy against the orthodoxy of the incremental approach without counting the experience of campaigns which have made substantial—if partial—gains, is to be unduly dogmatic. The campaigns against yaws in the early 1950s were resisted by the conservatives of the time advocating "business as usual" with the same vehemence as one encounters with the CSDR today, but there is no denying that substantial and permanent gains were achieved. The blanket case against a campaign strategy ignores the permanent value of social mobilization and therefore is flawed on four main counts.

1) It regards a campaign as an event rather than a high point of a continuing process which, if carefully designed, can rapidly accelerate the extension of permanent community responses to health needs.

2) It ignores the value of the heightened level of public conscientization and the consequent creation of a national climate in which other socially beneficial interventions (such as environmental sanitation and child spacing) may more easily take root and flourish.

3) It fails to give the mass of the people who participate in a CSDR campaign the credit due to them for understanding the value to them and their children of the intervention being offered and for taking great pains—often trekking great distances in the heat—to carry their children to a vaccination post or ORT centre. They perceive themselves as the subject rather than the object of campaigns and participate actively and voluntarily only because and when they see the intervention proposed as an opportunity to protect their children.

4) It assumes that social infrastructures are officials at various levels of authority, charged with a special mystique to provide health or educational services, and spurns the capability of non-governmental organizations such as priests of various denominations, trade unions, and other popular groupings, as integral and powerful dimensions of the permanent communal infrastructures without whose willing involvement no social change can occur.

Subject and not object of development

Finally, the CSDR as a means of bringing about rapid change in how the world tends to the needs of its children, is assailed on the ground that it is a distraction from "development". This brand of criticism bears the familiar signs of respectability and righteousness. Development is regarded as an orderly, incremental process linked to the pace of centrally designed five or seven year plans (their spans linked usually to the tenure in office of the planners) or determined by the mystic laws of the market place. Revolution is a hurried and disorderly affair with a penchant for opportunism, cutting across long established procedural proprieties, defying prudent concerns for the familiar "constraints" in material and human resources (the stock alibi of the tired bureaucrat) and, most reprehensible of all, bypassing the experts in health and education establishments and reaching out directly to the people.

For three decades after World War II "development" was perceived as economic development, its indices of success rated in GNP per capita and other similar material measures, however lopsided. In 1980, *The World Bank development report* made the startling discovery that development was about human beings and "human resource development" became the new gospel of the experts. Once again the human being is an object—a resource to be developed—and not the subject of development, his or her value being extrinsic rather than intrinsic.

In contradistinction, the principles and strategies of the CSDR are based upon motivation and mobilization of human beings to become actors in their own development, not merely stagehands or supplicants at the altars of resource development. Thus children are being immunized not merely because they are "a nation's most precious resource" but because they are children, and wells are being installed not because they are artefacts of development but because families will have better water and women and children will not have to trudge miles to satisfy a survival need. Parents empowered—and blessed—by the knowledge that their children need no longer die from diarrhoeal dehydration, or from vaccine-preventable diseases, do not indulge in schoolmen controversies about the theological niceties of development. If their children are protected against preventable death, their lives have "developed". A couple who have realized the value to themselves of regulating their fecundity, have "developed". The extent of their recognition that Fate is not invincible and can be influenced by their own actions, is proof that they have developed.

The caravan moves on.

Dossier

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Development theory

Immunizing for development

The Child Survival and Development Revolution and development theory

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UNICEF is participating in an accelerated development process which implies fundamental changes in development theory and development practice. These efforts are still scattered and weak. However, some major elements are clearly visible. Some are of a theoretical nature representing a more reflected and holistic view of how social reality is organized and operates, some relate to conceptual and other fundamental weaknesses in the predominant development paradigm; and some relate to* how*—based on a changed paradigm—more relevant development strategies need to be and can be developed. Because of the nature and the range of the questions raised, this overview is philosophical and normative rather than empirical.*

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* This is not meant to underestimate the important contributions made in this direction over the last decades by individuals and groups. In this context, it is worth reminding ourselves of the persistent advocacy for "another" development spearheaded by the Third World Forum, the International Foundation for Development Alternatives, the Dag Hammarskjöld Foundation and many others.

Assignment Children, vol. no. 69/72, 1985

Introduction

For all of us engaged—as best as we know and can—in the struggle for so-called development cooperation, the mid-1980s present a different, confusing and often frightening landscape compared with only a decade ago. The tragedies of acute human, social and economic crises in a great number of African countries have resulted in a harsh assessment of the international and national development efforts of the last decades.

During the same years, the attention, the debate and the energy have moved away from issues of development and more equity for the poor, towards the adaptation and adjustment of the poor to the rich. Parallel with this, the flow of resources in the world has dramatically changed through decreased transfers for development purposes and increased monetary flows from the poor to the rich. At the same time, the theoretical debate on development has faded, although much of what is presently taking place seems to confirm some basic assumptions in the centre-periphery models and the fact that after the temporary economic advance of some countries in Asia, the Middle East, and Latin America during the 1970s the development of underdevelopment has again been accelerated.

This situation presents a serious challenge calling for a realistic and vigorous analysis, which can again revitalize the struggle towards a more equitable and just development globally with a necessary bias in favour of the most exposed and vulnerable. As it lends its pragmatic support for improved child health and survival, UNICEF is also engaged in a debate intimately related to some basic theoretical issues of what has been the dominant development paradigm over the last decades. In this article, I shall attempt to identify some of the theoretical issues of this debate and how they need to be translated into criteria for guiding UNICEF's strategies and practice in its cooperation with countries towards child survival and development.

Overriding issues

1) The ethnocentric bias of the concept of development

A discussion of questions related to so-called development issues cannot neglect the conceptual, cultural, organizational, political and moral (you name it) confusion that the concept of "development" generates. Yet, few other terms are used so often and with so little questioning, as if it held the explanation to both what actually is going on and to what ought to happen. Its sheer complexity together with its dependence on what presently exists among the powerful have given it an aura of objectivity that it definitely does not deserve. The concept of development has its roots in the evolutionary theories of the last two centuries. Development concepts all suffered from the fact that they were both time- and space-centred. In biology, development—or higher levels of evolution—represented what exists and can be observed now. The species best equipped to survive actually survived until our times. Thus they were defined as more "developed" than those which did not. In the cultural-social-technological spheres, development was not only defined by what existed now but also by what existed here. That is, what existed at the time in the Western world and especially in the major countries of that world, which were consequently defined as the most developed. This follows a global historical pattern to give highest value to the situation in areas where the power to dominate and to influence others is momentarily located.

Why have these statements to be made while attempting to discuss a primary health care strategy? The answer is simple. These conceptual questions have to be brought into the open because they are as rarely mentioned as they are important. If the last four decades of so-called development had heard more debate of the weaknesses in the concept of development, the results of its application among the poorer countries of the world might have been more constructive.

From now on, the concept of development has to be finally moved away from its biased cultural and political roots. It has to be redefined so that instead it covers efforts and strategies towards goals that are unquestionably universal for humankind such as the fulfilment of basic needs and fundamental human rights, as well as such goals that represent specific cultural expressions of these.

2) The sectoral bias of our models of human reality

Since the Renaissance in the Western world we have witnessed a process of accelerated sectoring of human occupations and roles both in horizontal terms—specialization—and in vertical terms—stratification. This has been accompanied by a similar fragmentation of our knowledge about human reality, and by the emphasis we give to technology and economy as the most important factors in the Western world.

This has led to increasingly effective technology aimed at raising production and to an unprecedented capital accumulation in certain parts of the world and in certain strata of society. At the same time, these processes represent distinct sequences of underdevelopment—the exclusion of groups and strata from access to resources, and the disfiguring of knowledge about reality, and man in reality, by the emphasis on economy and technology over other aspects.

Instead, all theories of and planning for "real" development have finally to recognize that man is not only homo technicus and homo economicus. He is also homo sapiens, homo aestheticus and homo ethicus. His reality room is certainly *physical* and *technical*. But it is at the same time a room of social structures organized for survival and for other human purposes and it has walls of *knowledge* and decorations of *values* that give meaning—ethical and esthetic—to both the room and the lives of its inhabitants. These are all important aspects, and indeed inseparable aspects, of his total reality room.

The artificial subdivision—not to say atomization—of this total reality room into social, economic, cultural, technical and other sectors, must be substituted with fresh efforts to capture the wholeness of human reality both for our understanding of it and for our actions to improve it. Separate analyses of specific questions will certainly continue to be needed but they must be made in a way that understands, recognizes and respects the linkages with the whole.

3) The technical-economic distortion of the development paradigm

These fundamental imbalances or—to put it bluntly—the disfiguring of our understanding of human reality, have had devastating consequences for the whole development paradigm, reinforcing the already damaging implications of its ethno- and power-centred biases. Rajni Kothari expressed a similar concern when he wrote:

> "I suggest that the unidimensional and almost exclusively economic basis of the development paradigm has undermined the prospects for not just development, but for the sheer survival of large strata of the world's peoples. Mere transfer of resources and technology does not necessarily bring us any closer to the realization of a desired state. Unless one builds the human rights dimension into the development paradigm, this will not happen ... we have to think of human survival as the main aim of the development paradigm. We have also to see it as an essential condition of human creativity. And we must think of survival—like a subsistence economy—as not a negative, minimal goal but as a dynamic force projecting a positive alternative to the theory of progress and the goal of affluence, one that finds dignity in genuine equity and in diverse cultures working out their own strategies in local movements for democracy and autonomy."[1]

In order to achieve such a shift of focus in the approach to development, we have to remedy another weakness or bias in the predominant paradigm. The use of a model of reality of limited or distorted relevance to man has been a catastrophic mistake; from a knowledgeable actor, man has thereby been turned into an object for action to be aggregated with others into a passive target group defined by outsiders. And as a logical outcome of this illogical approach, his skills, knowledge, experience, as well as the purposes of his individual and social energy, have been defined away as distortions because the model against which they are measured is itself distorted.

Needless to say, this process has to be reversed to reflect the fact that no true development will ever take place if it is not the result of peoples' own decisions and actions based on knowledge relevant to them and for purposes selected by them.

Intermediate issues

In addition to the overriding theoretical issues indicated, there are a number of intermediate theoretical questions which need to be consciously addressed before strategies can be built upon a re-interpreted development paradigm that better reflects the essential nature of human reality.

These intermediate issues represent various intellectual and practical dilemmas brought about by a biased concept of development, a fragmented and ethnocentric model of reality, and the sectoral distortion in the development paradigm discussed above.

1) Symptoms and causes

When the organization of one form of society and mode of production is taken to represent the nature of man's reality, in general two fallacies are immediately created. One is the lack of distinction between forms and processes or between symptoms and causes. The other one is that when attempts are made to identify causes they tend to become projections of the accepted model rather than being based on an independent analysis of the specific reality room in question.

Symptoms are important and must often be addressed in development for moral reasons, if for no others. They are also important as indicators. They ought, however, only to be addressed if in doing so at least some of the generating causes are confronted. That can only be done by action based on a situation analysis that aims to identify both immediate and underlying causes wherever they may be found in the various dimensions of the total reality room, and that can help us to identify realistic possibilities to affect at least some of the causative factors.

2) Analytical complexity and pragmatic simplification

Based on the dominant development paradigm, a whole industry of development has been created with its own organizations and cadres of expertise—the so-called development experts. These achieve recognition and positions of power based mainly on skills and competences which are acknowledged in their own peer groups within the orthodox framework of the institutionalized models. This has often led to a mammoth production of complex problem analyses regardless of their relevance to the specific situation, rather than to do-able strategies founded on realistic selectivity. The result of this ambition has been either the encouragement of irrelevant and thus ineffective action (if reality does not correspond with the map—follow the map) or the discouragement of any action at all, since problems are presented as so intrinsically complex that the courage to act is killed. What is required is both a new and more informed problem analysis relevant also to the people sharing the problem and not only to the development expert. Therefore analysis and improved understanding of complexities are needed. But at the same time efforts towards pragmatic selectivity and simplification must be encouraged and the courage to act and correct during action, supported.

3) Immediate integration and phasing of efforts

A consequence of the professional urge to gain professional recognition, based on conventional assumptions and premises, is that it often results in complex development recipes presented as integrated approaches. Integration is indeed needed as most problems have multiple causes. At the same time, it is obvious that true integration must mean something other than the simplistic invitation of everybody professionally concerned with a problem, to do what they are used to doing in their sectoral specialities, with the only difference that they do it simultaneously.

True integration must instead mean that the various contributions needed are phased in sequences over time reflecting a thorough understanding of what constitutes first and consequent steps in a chain designed so that one set of actions lays the foundations for the next in a pragmatic and durable way. It is only through such a phased integration over time, in which demonstrable results are achieved and perceived at each step, that energy and competence can be released in a cumulative way towards the next set of goals.

4) Existing goals and transplanted goals

Intimately linked to this issue is the question of relevant goals for development efforts. By selecting goals already existing and relevant to people themselves, one major obstacle to effective development can be overcome. When goals exist and are accepted and undisputed, the possibilities of introducing necessary new skills and competences, and building effective organizations to achieve them, are greatly facilitated. If the goal, however, is also alien, little if anything will be achieved. Furthermore, if the national contribution towards development is seen to respond to already existing and highly valued goals and aspirations, then there will be important political and other rewards in supporting them. This is, in its turn, essential in order to create or mobilize the political will of a nation—one of the ultimate sine qua nons for any development process.

Towards action within the new development paradigm: the case for immunization

Adopting the development paradigm outlined above as a framework for action represents a strong vote for indigenous and endogenous strategies assisted rather than dominated by outside or international support. It means opting for do-able development and for internalized and sustainable efforts rather than the temporary growth of transplants. It stands for the support of development processes aiming at national coverage of needs rather than the creation of a project here, a project there, a project everywhere. Experimenting with "participatory" and "alternative" development approaches only on the microscale—valuable as it is—is no longer enough. Adopting it ultimately means opting for development based on the mobilization and empowering of all concerned actors and the utilization of all relevant means and resources wherever they exist in the total reality room of a nation and its local communities.

It is obvious that protecting children from the threats of vaccine-preventable diseases is an unquestionable value in itself. But are the intensified efforts globally, and UNICEF's special adoption of universal child immunization as an organizational priority and the way it is being done, "development" as it is being discussed here? Are they not another projection of the outsiders' concept of development? Are they not based on a sectoral model of human reality and pursued as a technological panacea for some of the ills of poverty? Do they not imply a symptom approach dependent on external transplants, rather than one moved by energy from within? Are they really not another fad that will flare for a short while and sputter into the shade when the glitter is gone? The best protection against these possible risks lies in a faithful translation of the essential qualities of the new development paradigm into pragmatic and effective action.

Reviewing the approaches recently chosen by a number of countries in accelerating their protection of children from vaccine-preventable diseases and other child survival measures, a very significant pattern is emerging. This is true also for the policies and strategies of many organizations which, like UNICEF, support these efforts.

Only a few years ago the question of immunization was regarded as a highly technical issue to be handled by, and only by, the medical profession and its subroles. Today, the solution is quite different. The issue has broken out of its institutional and technical imprisonment. It is debated by heads of states in international fora, it is demanded by illiterate mothers, and a wide spectrum of people are participating in its implementation. Of these and many other changes, two emerge as especially important. First, at the policy level, the attention has shifted from the tools to the purpose and meaning, and at the same time the debate has shifted its centre from constraints to possibilities. Secondly, at the action level, the focus has shifted from the technological aspects to the carrier of the technique. None of the changes have been anti-technology—in fact to a great extent the changes have been made possible by new techniques—but they have definitely been pro-user and pro-people.

These changes have culminated in directing increased organizational energy and imagination to the social and political aspects of immunization, in short, how to mobilize all concerned actors for accelerated joint efforts towards child survival. Because of this, we must apply the development criteria that I have sketched not only to the technique of immunization and its expected results, but also to the process of social mobilization for child survival.

Let me make this my point of departure for the moment and further review what is currently taking place or is planned to take place in a great number of countries. In doing this, it is easy to recognize the striking convergence between the processes and goals of social mobilization and some of the fundamental qualities represented in what I call the new development paradigm. These movements, building on a combination of political, professional, and popular mobilization, are all addressing issues central to the human right of freedom from disease and the right to survival.

The goals are the peoples' goals and not transplanted or imported recipes. Although the movements have been focused on the achievement of one limited set of purposes—and thus represent a pragmatic selectivity to facilitate action, the analysis behind has been both profound and complex. Therefore, they address not only symptoms but also fundamental biological and knowledge-based causes of underdevelopment in the areas of health and survival. Although the major roots of poverty are only marginally affected, such mobilization, addressing important goals of ordinary people in great numbers, can also release their social energy and increase their control over other aspects of their situation and make it possible to pursue other important goals of development. Furthermore, in country after country the commitments to the goals of health for all and to accelerate social, professional and political action to achieve them, are proving do-able.

Do-able in this context means among other things low-cost strategies. Without entering into a cost analysis of these strategies, I want to make two observations which I feel have not received sufficient attention.

For decades we have debated how to create or generate political will, quite rightly regarded as crucial for any development. Its importance has most of the time been adequately matched by its elusiveness, thus providing a welcome and useful excuse for experts whose plans did not work. Against this background it may be worth noting that in many cases political will *does* exist but remains imprisoned because there are no do-able propositions—which in many instances mean financially acceptable or low-cost alternatives—for which it can be released.

The real reason why this aspect of low cost and "do-ability" belongs in this predominantly philosophical and normative discussion is, however, not necessarily to be found in any pragmatic aspects. I regard the character of do-able also to be at the very core of the ethical qualities that I demand from a new development approach. If we want to address fundamental human needs, in a theoretically more mature way that better reflects the nature of man's reality room—and this is, in very brief form, what the argument in this article is about—it is *unethical* to produce at the end of the analysis "non-do-able" propositions. "Do-ability" is not only a question of costs and manpower. It is an ethical question. This should not be misunderstood to be an argument of "less and cheap" for the poor. On the contrary, it is meant as a strong plea for the initiation of effective and relevant action with and for the poor and vulnerable who are often deprived of such "development" by the very sophisticated nature of plans emanating from the development industry. The initiation of a process may not mean an optimal beginning but at least it may mean a beginning while waiting for the perfect infrastructure or a reallocation of other resources—including military expenditures—to grace the shanty-towns and the rural poor.

However, it is not enough that the process of social mobilization corresponds or responds to fundamental sets of qualities in the new development paradigm and to being do-able. For a process of social mobilization to be truly developmental in terms of the criteria outlined, it must also be effective in achieving the goals of the process. In other words, it is not enough that it constitutes potentially do-able measures with the desirable theoretical, ethical and pragmatic qualities. If the effectiveness in achieving the purposes is lacking it will remain only potential development and not actual. In this view, the criterion of effectiveness becomes also closely linked to the ethical core of the development paradigm and the translation into practice of those principles.

Such effectiveness is dependent—more than anything else—on the appropriate mix of participants and actors. Compared to community participation, which hitherto has at least in practice largely meant social mobilization at the local level (the "grass roots" — "people's participation"), genuine mobilization for development must build on processes of mobilization at all levels of society from political leadership, government machinery and other participating groups at the *national level* to similar activities at the immediate (provincial, district, etc.) levels as well as at the *local community level*. In addition to this vertical mobilization, which permits the mobilized energy to flow in both directions, centre-periphery, and periphery-centre in a mutually reinforcing way, the appropriate mix in social mobilization for development means, as I have already indicated, is a mobilization drawing on the resources in all the various contexts of our total reality room, e.g., the technological—the organizational, the information—knowledge, and the normative—value.

Just as there is a need for the former, vertical cooperation, so horizontal mobilization within all the various areas of reality at all these levels is equally indispensable. The application of this set of criteria means that the cast of actors and catalysts in the process of social mobilization must be broadened to include religious and other "value" based organizations, political parties, labour unions, professional organizations, women's and youth movements, and the whole mix of other voluntary organizations in addition to the communities themselves, allowing the whole social fabric to be energized. If events are created as part of such an ongoing process, concentrating action for a limited period of time on clearly identified goals, they may be useful, indeed indispensable, for creating the necessary attention and for maximizing the social energy which the whole process needs. But in order to be developmental, such efforts must go beyond the event and help to build, create and maintain appropriate systems that sustain the initiated measures over time and incorporate them as routine activities of community life. Ultimately, the effectiveness of social mobilization will depend on how successfully that transition is managed.

Reference

[1] Rajni Kothari, Communications for alternative development: towards a paradigm, *Development Dialogue*, nos. 1-2, Dag Hammarskjöld Foundation, Uppsala, 1984, p. 22.

Economics

The costs of UCI-1990 in wider perspective

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In a decade of rising poverty and malnutrition, the Child Survival and Development Revolution (CSDR) is an attempt to press dramatically ahead with low-cost but high-priority health actions, focused on children.

In this paper, Richard Jolly discusses four common fallacies concerning costs in achieving universal child immunization by 1990 (UCI-1990), rules to be followed and conditions for nation-wide expansion and sustainability.

The real victory will not only be in winning the battle for universal child immunization and universal use of oral rehydration therapy (ORT), but the extension into other areas of the same approaches, within an economic framework of "adjustment with a human face".

1985 marks the sixth year running when the developing countries as a whole have experienced negative or negligible growth of per capita income. Against the bold goal of the United Nations Third Development Decade which called for 6% growth on average, and 7% in the low-income countries, and against the achievement of an average of 5 to 6% growth over the 1960s and 1970s, the stagnation and decline of the 1980s stands in tragic contrast.

The 1980s will almost certainly be recorded by future development historians as a decade of rising poverty and malnutrition in many, if not most countries of the world. Certainly this is true for the vast majority of countries in Africa and Latin America. It is probably true also for many of the better-off

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countries in the Middle East. Even in the USA, the United Kingdom and some of the other industrialized countries, the number of the poor has been rising, and possibly malnutrition among the poorest as well. Only in the economically-dynamic Asian countries can one be reasonably sure that malnutrition and poverty are declining rather than increasing, both as regards the proportion of the population affected and as regards the depth of poverty and malnutrition they experience.

In Africa and in Latin America, the situation is one of a worsening of poverty and malnutrition, not merely, as for so long before, of its persistence. Nor, as often before, is it a matter of worsening poverty in some countries with improvements in others. The early 1980s have produced a strong, sustained and systematic set of downward international pressures on the majority of developing countries, with the consequence that living standards have very seriously deteriorated. There is still time for change, but without it, the second half of the 1980s will not improve very much.

It is, paradoxically, this context of unprecedented economic pessimism, unprecedented at least since the 1940s, which gives added significance to UCI-1990 and the other elements of CSDR. For CSDR represents a movement against the trend. When so much else is cut back and constrained, CSDR is an attempt to press dramatically ahead, with low-cost, high-priority health actions, focused on some of the most basic needs of the great majority of children. The movement against the trend has made dramatic headway over the last few years. Over the two years since 1983, when health budgets have often been cut back further and only rarely have been increased, vaccine use has tripled and ORS use has expanded two-and-a-half times. More than 60 countries now have plans for moving towards universal child immunization by 1990.

There is a long way to go before victory can be claimed. And the real victory will not only be in winning the battle for universal child immunization and universal awareness and use of ORT, but the extension into other areas of health and basic human needs of the same principles and approaches: namely, universal access to approaches which meet the needs of ordinary families and their children at levels of cost which can be afforded and sustained.

Costs and cost confusion in achieving UCI-1990

Why are the costs of UCI and ORT programmes so important? The primary answer, I would suggest, is to ensure that the programmes are designed and carried out in a way that can succeed and be sustained. This is very different from simply checking whether the programme is "affordable". Many projects, especially aid projects, are affordable, at least to the donor. But they may subsequently collapse because recurrent costs for upkeep were not affordable to the recipient government; or the project may continue—but fail in its objectives of benefiting the poor, or women, because the costs of participation for these groups of people in the projects made no economic sense to them.

The calculation of programme costs are, therefore, of fundamental importance for ensuring:

- sustainability;
- community participation, especially of the poorer or more vulnerable members of the community;
- an equitable distribution of the benefits of a project or programme.

These concerns underline some common confusion over costs.

Fallacy 1: *costs are largely unchangeable and fixed*

The first preconceived idea is that costs are fixed and largely unchangeable. Obvious as this may seem, example after example shows it to be misleading. In health, education, across the whole range of basic services, costs per beneficiary vary enormously often by a factor of 10 to one or more, regardless of what measures of cost one is using. The same is true of health services, even more so if one contrasts the costs per person treated in different types of facilities, local clinic with paraprofessional staff, mobile services, district, regional or national hospital. Of course, costs vary in part with the type of service provided and one is often not exactly comparing like with like. But the point is that these realities are too often disguised in cost calculations expressed in terms of average costs per person.

More important, too often the differences in approaches and organizational structures which account for these variations in costs are ignored instead of serving as a stimulus to energetic exploration of how the type of structure and organization which leads to the lower cost can become the model for expansion.

Rule 1 therefore is to give attention to analyzing variations in costs and exploring how the lower-cost approaches can become the model for expansion.

Fallacy 2: *the purpose of costing a project before implementation is restricted to the affordability of that specific project approach*

The second preconceived fallacy is directly linked to the preceding one. The purpose of checking what a project costs is not limited to see *whether* one can afford this particular project. If it is a basic needs/basic services project or programme, the real question is how can the need be satisfied in a way which the household, the community and the state *can afford*.

Rule 2 is therefore to use costing early in project design in order to devise a programme approach (or approaches) which can be afforded by all the parties concerned and sustained over time.

Many elements of project or programme design may need to be varied to achieve an affordable low-cost structure which, at the same time, has the potential to achieve universal coverage and universal participation.

Often the whole approach will need to be rethought to achieve this—for instance, using a community approach rather than reliance on formal institutional systems; changing the technologies used; using less qualified staff rather than more highly skilled; using volunteers rather than fully paid staff.

Fallacy 3: *there is one unique measure of costs*

The third preconceived fallacy is that there exists only one way to measure costs. There are always several measures.

Rule 3 therefore is to choose and analyze the various measures of costs in relation to the objectives of the project or programme—and to consider the different costs from the viewpoint of the different parties involved.

For UNICEF, primarily concerned with children, the poor and vulnerable, the key questions of cost will be how will the costs of the project or programme bear on:

- children and their families, especially children in poorer families;
- local communities, especially poorer rural communities or urban slum communities;
- local, state or central government, especially over the longer run.

Fallacy 4: *all costs should always be included and costed*

The fourth preconceived fallacy is that all costs should be included for the sake of objectivity.

The assumption of objectivity is at least a useful reminder that often costs are fiddled, in the hopes of persuading someone to start, support or stop a project, in a way which might not be done if the full facts were known.

Part of the remedy has already been given in Rule 3—include those costs which bear on the different groups identified in relation to the objectives of the project. But a *Rule 4* is also needed. It is necessary to distinguish carefully the costs at different stages of a project or programme, especially:

- initial start-up costs, including often initial capital investment;
- long-run recurrent costs, when the project or programme is well underway;
- foreign exchange costs, corresponding essentially to the additional foreign exchange required for the project to be implemented and sustained.

The above distinctions may often in practice be more important than the more conventional distinctions between capital costs and recurrent costs, as commonly made in government budgets; fixed costs and variable costs, as commonly made in many economic text-books. Some of the above measures of cost overlap.

Costs and cost effectiveness

A critical condition for success in going to scale is that the costs should bear some "reasonable relationship" to resources available. This is an obvious necessity, but it is surprising how often attempts at going to scale are embarked upon without any serious consideration or even any rough calculations being made of the costs involved, let alone of how costs are likely to grow, as one moves to scale.

For child survival and development interventions—as, indeed, for most interventions to meet basic needs or basic services, cost-effectiveness analysis along these lines is both more feasible and more relevant than cost-benefit analysis. Cost-benefit analysis requires some quantified estimate of the future economic benefits which would flow from the intervention—by its nature a difficult and hypothetical calculation for "human investments". In contrast, cost-effectiveness calculations are simpler and more direct.

Two cost conditions are of fundamental importance as a matter of basic efficiency:

1) the costs per person of any mass intervention need to be low enough to be sustainable. This is a matter of exploratory investigations, especially to consider whether one can find lower-cost approaches to the same end, a useful exercise at any time, but notably in the initial stages of planning and periodically during implementation;

2) long-run recurrent costs per person of any intervention, need to bear a reasonable relationship to the resources available if the intervention is to be replicable on a national scale.

Especially important is the need to consider costs to whom. The costs which will be borne by at least three important groups need to be considered:

a) government costs (central, state and local);

b) community costs (including non-governmental organizations);

c) costs to the families and individuals involved.

At least some initial rough estimate needs to be made of the long-run recurrent costs to be borne by each of these groups.

The price of long-run recurrent costs being too high may well be the failure of the whole effort of going to scale—because the costs to one of the parties become more than they will bear. Once this happens widespread support and participation are by definition unsustainable.

There is no scientific definition of "reasonable". It is not a question of level but of relativity—relative to other claims on resources, time and effort. For government, a key "comparison" is that the unit costs should be "reasonable" in relation to government revenue or government expenditure per head. Such ratios can be indicated by showing, for example, child survival and development expenditure per head as a proportion of total government expenditure per head, or expenditure per head in the health sector or in the other social sectors generally. Total costs also need to be reasonable in relation to the total of resources in the country—and these can be shown as a ratio of cost per head in relation to GNP per capita.

As a rule of thumb, one of the easiest and quickest checks is to calculate long-run recurrent cost in relation to per capita income. For any intervention to have the potential for sustained mass application, its long-run recurrent costs must be "reasonable" i.e., small in relation to per capita income, otherwise national resources will simply not be available to support it. In fact, of course, per capita income usually overstates the resources available, since income distribution is skewed and thus the share of income available for an intervention for all will be only a fraction of the total.

For individuals or households, the relevant costs they have to bear are best shown as a share of their total income, in cash or kind. But as focus is likely to be on the poor, the critical ratios are those of the costs which a poor family must bear in relation to some indicator of their incomes, e.g., average incomes of the lowest 20% of urban or rural families. As a rough indication, it is often useful to show these costs as a proportion of the minimum wage, a statistic usually available without much difficulty. Since the minimum wage is usually more than a poor family receives, the ratio of unit costs to the minimum wage is a crude guide to the maximum of what is probably reasonable. In the long run, only experience can provide hard evidence as to the level of costs which is acceptable—and consistent with widespread and willing participation or "going national". But unless the burden on individuals in terms of the costs they must bear looks reasonable in relation to typical family expenditure patterns, one can be fairly sure that participation by the really poor will prove impossible.

One must scrutinize therefore most carefully suggestions for anything but the most minimal charges for services for low-income communities. Even if no charge is levied, there will be costs to meet, in terms of time and effort to attend, often including travel costs. If one wants full coverage, such costs must be kept to a minimum.

Broadening beyond UCI and ORT to "adjustment with a human face"

As mentioned earlier, the real battle is for the universal application of low-cost approaches over the whole area of basic needs. This, if carried through, would add up to a restructuring of national resources towards a development strategy with strong components clearly directed toward the basic needs of the poorest groups. This was widely accepted as development orthodoxy in the mid-1970s, when strategies of basic needs and redistribution with growth were strongly advocated.

The implementation of such strategies today is economically more difficult, if only because resources are much more constrained: indeed, the challenge is redistribution in a context of decline rather than growth. The political significance of CSDR is that the very success of immunization and ORT can provide leading edges for showing that a broader range of basic needs reforms are possible.

"Adjustment with a human face" would mean the incorporation of such cost-effective approaches into the dominating part of economic policy, that of adjusting to balance of payments shortages and restructuring the economy for growth and development in a more constrained economic environment.

As I have explained elsewhere,[1] adjustment with a human face would involve three types of policy action:

1. *a clear acknowledgement in the goals of adjustment policy of concern for basic human welfare and a commitment to protect the minimum nutrition levels of children and other specially vulnerable groups of a country's population;*

2. *the implementation of a broader approach to the adjustment process itself, comprising four components:*
    - *a)* actions to maintain a minimum floor for nutrition and other basic human needs, related to what the country can in the long term sustain;
    - *b)* restructuring within the productive sectors—agriculture, services, industry—to rely more upon the small-scale, informal sector producers and to ensure their greater access to credit, internal markets and other measures which will stimulate growth in their incomes;
    - *c)* restructuring within health, education and other social sectors, to restore momentum and ensure maximum coverage and benefits from constrained and usually reduced resources. Already, there are important examples of what can be done to reach all of a country's population, but still at relatively low cost;
    - *d)* more international support for these aspects of adjustment, including the provision of more finance, with more flexibly provided and with longer-term commitments. The extremes of the present situation will often require a ceiling on outflows of interest and debt amortization if the protection of human needs is to be feasible in the short run;

3. *a system is needed for monitoring nutrition levels and the human situation during the process of adjustment.*

There is one point about adjustment with a human face which is frequently misunderstood. Because the focus is on human need, there is a common tendency, almost a reflex action of the economic mind, to think of the programme as a welfare programme. In contrast, I would stress that the programme is primarily a programme of enhancing production and investment, though in an area of production and investment often overlooked and downplayed in spite of clear economic evidence of the positive and often high economic returns accruing to these activities.

Reference

[1] Richard Jolly, Adjustment with a human face, Barbara Ward Lecture, *Development*, vol. 4, SID, Rome, 1985, pp. 83-87.

Operational issues

UCI-1990: a discussion of some operational issues

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In the first part of this paper, Nyi Nyi discusses some of the common characteristics of successful accelerated immunization programmes: setting a target and goal to be reached, strong political will, involvement of other branches of government in addition to the ministry of health, social mobilization of all sectors of society, good planning, technical and management support, and availability of both domestic and external resources.

In the second part, he discusses some major operational issues which are emerging from recent experiences, such as sustainability, immunization as the leading edge of PHC, costs, herd immunity, reaching the unreached, awareness of impact, and disease surveillance, which need to receive more attention if accelerated EPI is to be efficient and effective.

Introduction

In 1974, the World Health Assembly established the Expanded Programme on Immunization (EPI) in the aftermath of the successful eradication of smallpox in the world. In 1977, the Assembly further endorsed universal access to immunization by 1990 as the goal of EPI.

During recent years, with the target date approaching, various national leaders of the developing world have redoubled their efforts to reach this goal with the active support of the interna-

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tional community. Although universal immunization looked distant a few years ago, it now appears achievable as a result of the immense efforts exerted by the developing countries. In many of these, it has been transformed from a public health measure into a revolutionary social movement with all its implications.

The significance of the goal of universal child immunization (UCI) has been duly recognized by the United Nations secretary-general, who issued an appeal to all the heads of states and governments to reaffirm their determination to achieve this goal as an expression of support for the 40th anniversary of the United Nations in 1985. The secretary-general's appeal was answered and endorsed by 71 leaders of the world during the celebration of the 40th anniversary, an effort hitherto unequalled.

Success factors

UNICEF has promoted the concept of the Child Survival and Development Revolution, with immunization as a component, since December 1982, and has been involved in active support of national efforts to accelerate immunization programmes in several countries including Burkina Faso, China, Colombia, El Salvador, Ethiopia, India, Nigeria, and Turkey.

A significant factor which has emerged is the diversity of approaches adopted in accelerating immunization programmes. Brazil, Colombia and the Dominican Republic have emphasized national immunization days as a means of launching accelerated efforts. Burkina Faso and Turkey have adopted campaign approaches in which each pulse of effort extends over a week or a month. Nigeria's achievements have been based on social mobilization, without use of a campaign approach. There, a model project was developed in the Owo Local Government Area and rapidly expanded to Ondo State, from where it was further extended to the other states. Ethiopia, Somalia and the

Sudan are, as a first step, concentrating their acceleration efforts in urban areas, leading to later expansion to the rural population.

Experience indicates that efforts which have been successful have had a number of common characteristics: a target and goal to be reached, strong political will, involvement of other branches of government in addition to the ministry of health, social mobilization of all sectors of society, good planning, technical and management support, and availability of resources, both internal and external.

Setting a target

In all human endeavours, setting goals and targets within a time frame provides incentives to mobilize inherent latent energies. It also promotes healthy competition amongst various institutions and communities. It must, however, be noted that in all mass movements, it is rare that the goals and targets are achieved in a single thrust. It generally takes several successive waves of effort, each carrying the achievements to a higher level.

Although the goal of universal immunization within the next five years looks attainable in countries which already have high coverages (60 to 70%), it may appear unrealistic in countries which currently still have very low coverages (1 to 5%). It is, however, most likely that the latter will be the countries making special and extraordinary efforts, thus reaching a respectable level of coverage, while countries in the 30 to 40% range may lag behind, as they may not feel the need for extra effort and yet will be unable to achieve the goal through incremental advances.

Although the task of raising coverage from a level of 1 to 5% to one of 80 to 90% looks herculean, history has shown the extent of human ingenuity in meeting such challenges in times of need. This is perhaps best illustrated by the case of children in Great Britain during World War II. Despite the scarcity imposed and expenses incurred by the war, children were generally healthier, better fed and experienced a significantly lower mortality rate than during the years preceding it. This was due to an innovative response in times of hardship which consisted in placing a greater emphasis on health protection as well as on the nutritional needs of the population through balanced food rationing.

Political will

To be successful, all movements and efforts on a national scale need the commitment of national leadership, especially for activities which are implemented through governmental institutions and facilities. Political will at the highest level ensures multisectoral inputs and the coordination always required for nation-wide efforts, as well as the generation and allocation of financial, material and human resources. It may be prudent to note that political will needs to be present not only at the national but also at the state and provincial levels, leading to its subsequent establishment at the level of village and community leadership. The significance of political will has already been discussed in this writer's paper on going to scale, which may be referred to for more details.[1]

Social mobilization

If the single most important and unique contribution of UNICEF to the success of national immunization efforts in recent years were to be identified, it would be the facilitation of and support provided for social mobilization in different countries. This involves, essentially, the broad mobilization of the whole society for a common objective.

Social communication processes provide information and know-how, but can also move to a higher level, which leads to the motivation and mobilization of a whole nation to achieve a common objective. Social mobilization is achieved through the internalization of programme objectives by the people, thus ensuring the creation of consumer demand, availability of human, material and financial resources, and multisectoral inputs. When all social groups aspire to the attainment of a national objective which transcends political barriers, means are found, solutions are developed, and innovations become commonplace.

An illustrative example is offered by Burkina Faso where, during Vaccination Commando, provincial high commissioners mobilized all available home refrigerators and means of private transport to supplement national cold chain facilities and public transport during the three campaign weeks. There was little resentment at what was felt to be a small personal sacrifice, as it was seen as a contribution towards the realization of a national cause.

Total social mobilization is not required in a well-functioning system which has already achieved national and universal coverage. However, it has been found useful and necessary, in order for a movement to be successfully launched, in countries where the bureaucracy and people do not yet share a full commitment to a common goal and also in countries where a revitalization of the machinery is indicated because it has either become stale, or has been slowed or stalled.

Planning, technical and managerial support

Literature abounds on the need for good planning, technical and managerial support without which efforts cannot be meaningful or succeed. The ready availability of potent vaccines and equipment, cold chain facilities, logistics, recording systems, trained personnel, surveillance, etc., needs no reiteration, as various WHO and UNICEF manuals and guidelines already exist on the subject. Wherever political will exists and social mobilization has taken place, good planning and adequacy of technical and managerial support make the difference between success and failure. Good planning ensures the availability of services, smooth operation and possible later assessment. Good management ensures that everything is in place when and where it is needed.

Resource availability

Although all mass movements release latent energies and resources in society, experience indicates that new ventures or scaling up of ongoing activities always require additional resources. Despite possible substantial contributions from external sources, it is likely that the major extra burden will have to be carried by domestic resources. New or reallocated resources may be made available as a result of a shift in government priorities, as well as the mobilization of volunteer labour inputs, and voluntary contributions for a good cause, e.g., free television time, free media space, free contributions by artists, and by communities taking on implementation responsibilities including a share of expenses as a result of the popular internalization of objectives.

The fact that the major burden falls on domestic resources does not, however, obviate the need for some external resources even in middle-income countries, especially in view of the deep recession that many are now going through. In low-income countries, where foreign exchange needs are most acute, imported elements like vaccines, syringes, cold chain spare parts, etc., are likely to be items for which external support will be required for many years to come. Even in the best planned countries, budget lines cannot always be shifted overnight, due to prior commitments and the need to maintain already established institutions. They may therefore also require recurrent external support, at least in the early years, for fuel, maintenance, spare parts, per diems for travel, etc.

External support has been estimated to be at a level of 20% in general, although needs vary from country to country. Countries that have undergone severe recession may need greater support over longer periods. The duration of external assistance needs to be carefully planned so that dependency syndromes are avoided and assistance can be eventually phased out without detriment to the long-term continuation of the programme.

Some major operational issues

EPI workers are aware of the usual operational problems such as the efficient management of the cold chain, potency of vaccines, scheduling of vaccines, etc., and, lately, the need for political will and social mobilization. An analysis of recent experiences, however, shows an emergence of some major operational issues which need to receive more consideration if accelerated EPI is to be efficient as well as effective. These issues include:

1) sustainability;
2) immunization as the leading edge of PHC;
3) costs;
4) herd immunity;
5) reaching the unreached;
6) awareness of impact and disease surveillance.

1. Sustainability

Past experience has shown that the life of high visibility campaigns or similar efforts are usually about three to five years, up to 10 years for international campaigns (e.g., malaria, smallpox). After reaching a peak, the campaign momentum slowly subsides. It is therefore important that, before the crest is reached, systems be foreseen which can, after the peak of interest, carry on and maintain the level of activities. Although campaigns or similar popular mobilizations are essential to galvanize interest and support, only established systems can ensure long-term sustainability. If these systems are not yet in existence at the time of accelerated efforts, opportunities to establish them should be explored during that period.

It should, however, be remembered that the availability of services does not necessarily imply their use. A study in Bangladesh showed that while immunization services were currently available to about 20% of the target population, only 2 to 3% had actually availed themselves of them. Social communication processes thus continue to play a major role in creating a consumer demand for services which, hopefully, are already in place. It is also essential that knowledge received is transformed into practice.

In countries where primary education reaches a sizeable percentage of the population, primary schools can be a means of educating and organizing for immunization. They may also help to ensure that children have been immunized by making properly completed immunization cards a requirement for school admission. In countries where enrollment is still low, however, those most in need may still not be reached, as they are very often also those who are bypassed by the education system.

It is essential that during the early planning stages of accelerated immunization programmes, a conscious effort is made to ensure sustainability.

2. Immunization as the leading edge of PHC

Immunization is part of public health as well as of preventive child health care and as such is related to other public health and child health measures. It is likely to be better sustained financially as well as operationally if it is part of the PHC system of a country, not to mention the accrued benefits of synergism. It is therefore essential that immunization be implemented as part of PHC or that it leads to the establishment or strengthening of the PHC system.

An analysis of the current experience of accelerated programmes shows hopeful signs of such achievements. A major, previously inexistent factor has been social mobilization which has led to a change in the social dynamics of the health sector.

In middle-income countries where the health infrastructure is already well developed (e.g., Colombia, Turkey), the recent immunization campaigns have led to a revitalization of the system. In Burkina Faso, where the health infrastructure has a limited geographical outreach, Vaccination Commando will lead to the establishment of a PHC structure in all 7,000 villages, each of which will have two community health workers. This has been found to be necessary in order to consolidate the gains of the campaign. In several countries (e.g., Dominican Republic, India, Pakistan, etc.) immunization efforts have, on the other hand, led to the enlargement of PHC, by the extension of outreach through the use of paramedicals and community and other health workers. In other countries, and in the city of Addis Ababa, programmes of accelerated immunization have been implemented as one element of a package of child survival and development activities within the broader context of PHC. It is thus interesting to note that, although it was not always originally planned, accelerated immunization efforts have in all cases led to the establishment or the strengthening of PHC. Needless to say, this is better ensured where it is consciously incorporated from the commencement of activities.

3. Costs

A weak element in all recent accelerated immunization efforts has been the understanding of costs. These have varied from US$ 4 per child to over US$ 60 per child. There is, as yet, no consensus concerning the various elements to be included in arriving at the total cost. Since these are important for determining affordability and replicability, an understanding needs to be reached as to what constitutes the actual costs. Although knowledge of all real costs (including the opportunity costs) is useful, it is the actual, additional expenditures that need to be borne which are of more interest to governments. The shifting of a low-priority to a high-priority task does not necessarily involve extra costs to governments. For a developing country with a subsistence economy and underemployment, opportunity costs may not be as meaningful for strategic considerations. Contributions by television artists, media, etc., are generally not counted as costs in developing countries as they do not entail additional expenses for the government or the organizers. A better understanding of costs is being developed.

4. Herd immunity

Although universal coverage implies a total coverage of the target population, it is rare that the entire concerned population is actually covered in any endeavour. There will always be a segment of the population that can never be reached because of geographical isolation or other reasons.

Since the purpose of universal immunization is to immunize all infants and children so that, ultimately, the vaccine-preventable diseases are eradicated, the first step towards this achievement may be to try to reach a state of "herd immunity" in which the transmission of communicable diseases can be controlled.

This level would be that of a minimum coverage of immunization, although it must be understood that immunity is not imparted to the non-immunized who may therefore still contract a disease if they are exposed to infection.

Anderson and May[2] have recently made an interesting study of the relationship between the transmission dynamics of infectious agents and herd immunity, which varies from disease to disease. They suggested that 92 to 96% of children may need to be immunized to eliminate measles and pertussis, although admittedly an even higher percentage of coverage would provide less opportunities for infection leading to the spread of the disease.

An interesting factor brought to light by the study is the heterogeneity in the spatial distribution of hosts, leading to the heterogeneity in transmission rates. This can result in the transmission potential of an infection being greater on average than suggested by estimation procedures which assume spatial homogeneity. Under these circumstances, the optimal strategy might be to aim for a higher vaccination coverage in communities with a high population density. Since population densities between rural and urban areas are marked in many developing countries, a further practical significance of these findings may be that highly communicable diseases such as measles cannot persist endemically in rural areas without frequent movements of people between them and urban areas. Disease control might be achieved in both types of areas by higher levels of mass immunization in the urban centres alone, supplemented by immunization of those from rural areas who come to towns (e.g., on market days). The subject remains of particular significance in planning strategies and the results of current studies may be closely followed for their practical implications.

5. Reaching the unreached

In most social programmes there is a proportion of the target population which is never reached, but there are few studies which have identified the specific characteristics of these groups. The proportion is usually around 30% or one-third of the population, and is generally presumed to consist of socio-economically disadvantaged groups representing the population segments most in need.

It is interesting to note that even the best conventional programmes reach a plateau at around 70% coverage, as seen in Thailand and other countries. Although it is generally assumed that the unreached are in the remote villages and rural areas, recent statistics tend to show that many may in fact be in the cities.

In the Philippines, 1983 data showed that while most of the provinces had coverages of DPT2 above 70%, Metro Manila had the lowest coverage at 38%. This was even lower than the lowest recorded in Central Mindanao, known to be the least developed and most neglected region of the country. This general picture was true for all antigens. During the recent campaign in Turkey, Ankara had a coverage rate of 54%, Istanbul 71%, and Izmir 60%, while 41 rural provinces had coverages of 90% or more. Even assuming that there may have been earlier immunizations before the campaign which had not been recorded, coverage rates in cities still appear to trail behind the rural areas. This probably indicates an area where further attention may need to be given in tracing the unreached.

6. Awareness of impact and disease surveillance

In all meaningful efforts it is important to have a purpose. Coverage rates are useful but they are only means to indicate the extent to which targets have been achieved in controlling or stopping the transmission of disease. The ultimate impact would, however, be the reduction in the incidence of diseases which are vaccine-preventable. It is therefore of paramount importance that data are collected not only on the coverage achieved but also on the extent of mortality and morbidity due to vaccine-preventable diseases. Ongoing disease surveillance and periodical surveys of impact are necessary.

It may be of interest to note that the impact of immunization programmes has already been noted in the reduction of disease incidence in some countries. Latin America has embarked on polio immunization more intensely during the last five years and its impact is already well known. Two lesser known data have also come to light recently indicating that the impact of immunization has already been noted on the morbidity of vaccine-preventable diseases in China and Sri Lanka.

TABLE 1

Reduction of incidence per 100,000
Sichuan, China, 1981-1984

Diseases	1981	1984	%
Diphtheria	1.25	0.57	54
Pertussis	37.52	12.08	68
Measles	123.65	81.18	34
Polio	0.07	0.03	57

TABLE 2

Reduction in incidence per 100,000
Sri Lanka, 1978-1984

	1978		1984	
Diseases	Cases	Rate	Cases	Rate
Polio	153	1.0	16	0.1
Diphtheria	216	1.5	17	0.1
Tetanus	2,028	14.2	292	2.5
Neonatal tetanus	874	21.7	84	19.2
Pertussis	703	4.9	201	1.3
Tuberculosis	6,360	44.8	6,000	38.0

In this social dynamic, where new elements are being added and forces being unleashed, a process of learning by doing may be the most appropriate mode of operation.

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Towards universal child immunization

Lessons learned and questions raised since the 1984 Bellagio Conference

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More than 40 countries will undertake major EPI acceleration within the next two years.

Stephen Joseph points out the healthy diversity of approaches observed in the countries which have massively accelerated their EPI efforts during the past two years. Some lessons can already be drawn. An important phenomenon is taking place: the transformation of a health programme into a social movement. This represents the vital link between EPI and PHC. Existing campaign strategies are different from other campaigns of the past. They develop a "positive programming momentum" extending beyond immunization. Other lessons point to difficulties which require creative solutions. Production and distribution capacities of supplies other than vaccines may create bottlenecks and it is also necessary to address more thoroughly the issue of recurrent costs.

This paper is intended to be provocative: to set out the issues that are before us as we strive for immunization of all the world's children. I would hope, and intend, that it stimulate debate and catalyze thoughtful solutions to the problems—political, financial, epidemiological, technological, motivational, logistical, and evaluative, that still lie before us.

Revised version of the paper presented at the Conference on Protecting the World's Children (Bellagio II), Cartagena, Colombia, 14-16 October 1985.

Assignment Children, vol. no. 69/72, 1985

1990, a turning point

In that vein, let me begin with an assertion which may seem overbold to some: 10 years from now, in 1995, we will be able to display solid data of massive decline of death rates from measles and tetanus, of disability from polio—from all corners of the globe—from virtually every country. These childhood killers and cripplers, markers for the effectiveness of the Expanded Programme on Immunization (EPI), will not have disappeared completely. But they will only appear by the mid-1990s as, say, deaths from tuberculosis in the affluent countries appear today, as compared to tuberculosis deaths in Europe and North America a century ago.

As those data become increasingly reliable and increasingly global in the mid-1990s, we will see that the sharp break point on the mortality curves occurred about 1990, and that those downward trends break very sharply indeed. Those data will indicate that the drive for universal child immunization by 1990, the goal of EPI first set out by the World Health Assembly in the mid-1970s, "was" (speaking from that future time), to all intents and purposes, achieved, and will validate the proposition that WHO, UNICEF, and other partners are making now, in the mid-1980s, that it can indeed *be* achieved.

There will be pockets of less-than-totally-successful national programmes, of course. The six diseases will not be eradicated. Continued immunization of all children will still be necessary. But the major battle will have been won, and the necessary high-water mark will have been achieved by 1990 *and sustained* thereafter. And this 1990 achievement, when we look at it retrospectively in the mid-1990s, will be seen to have occurred through a massive acceleration of programme efforts that began about 1984, that gathered momentum in country after country in the late 1980s, building upon, and progressively increasing, the solid foundation laid by 10 years previous work in EPI, adding new techniques that allow for quantum expansion of accessibility of immunization.

That is what, I believe, is going to happen. I doubt it will fall short unless we consciously turn back from the task and deliberately *reduce* our efforts at acceleration, or unless a series of regional or global cataclysms make this effort impossible or even irrelevant.

We can at this conference, and I hope we will, argue about the accuracy of this prognosis, about its epidemiological, fiscal, and logistical dimensions. The other prepared papers that are presented and, even more strongly, the descriptions of the remarkable experiences that have been achieved in the past several years in country after country will, I am confident, buttress my case.

What has begun to happen in the mid-1980s to so remarkably accelerate this effort? What existing and new foci of momentum have led to several tens of *millions* of more children being fully immunized in 1985 than in 1982 or 1983, and to WHO lowering its estimate of annual deaths from the EPI diseases from five to 3.5 million? What new controversies and possible hazards have arisen out of these national and global efforts that we will hear described here? What lessons have we learned, and what questions have been raised, and what should we do about both sets of issues? What has been the recent experience?

Current and planned EPI accelerations

In the past year or two, more than a score of countries have massively accelerated their EPI efforts, most of them with resultant large increases in the proportion of children fully immunized. Twenty, or perhaps 40, additional countries will undertake major EPI accelerations in the next 12 to 18 months, among them the "giant" countries of Bangladesh, China, India, and Indonesia. Table 1 is a tentative list of countries that have already undertaken or are planning within the next two years to undertake such accelerations. I say "tentative list" because it changes almost daily as additional countries announce their intentions. I also say "tentative list" because, as we all know, intentions and deeds are not always synonymous, and also because the definition of "acceleration" is necessarily a somewhat elastic one. Nevertheless, this tentative list, with apologies for unintended omissions, is useful, because it should indicate the size and scope of what has become a global movement of very significant dimensions.

TABLE 1

Countries undertaking acceleration of EPI programmes

	Prior and/or current		Planned	
	1984 & prior	1985	1986	1987+
AFRICA	Burkina Faso Nigeria	Ethiopia Ghana Senegal Somalia Uganda Zaire	Angola Benin Botswana Burundi Central African Republic Congo Djibouti Equatorial Guinea Gambia Guinea Guinea Bissau Kenya Madagascar Malawi Mauritania Mozambique Rwanda Sierra Leone Tanzania Togo	
AMERICAS	Bolivia Brazil Colombia Dominican Rep. Nicaragua	Ecuador El Salvador Honduras Paraguay Peru	Guatemala Haiti Mexico	
ASIA	Maldives Pakistan Sri Lanka Thailand	China India Nepal	Bangladesh Bhutan Burma Indonesia	
MIDDLE EAST		Iraq Sudan Turkey	Egypt Jordan Oman Syria	Democratic Yemen Yemen Arab Republic

Best estimate list from UNICEF sources as of October 1985. List most probably contains omissions. Some programmes are sub-national in extent. Country programmes do not necessarily meet the definitions proposed in this paper. Additional countries will no doubt be added in 1986 and beyond.

The presentations at this conference regarding Latin America in general (which is in immunization terms both the most advanced and the most rapidly-advancing Third World region) and of the Colombian experience will give tangible detail to these assertions. The comments we shall hear later, from such nations as Bangladesh, Burkina Faso, China, Dominican Republic, Egypt, El Salvador, India, Indonesia, Mexico, Nigeria, and Senegal will add graphic details of current and planned activities. But many more countries than are present here, particularly small countries, are mobilizing for significant accelerations, or are already making major strides forward. Two examples of the latter category in Latin America are Bolivia and Peru. Turkey is currently in the midst of a campaign effort that has reached, by preliminary estimate, 81% of its children in the first round. Country after country is scaling up.

Healthy diversity of approaches

A most important feature of this global mobilization is the diversity of specific approaches, within an overall context of political and social mobilization. Brazil, Colombia and the Dominican Republic have emphasized "national immunization days" as a means of launching accelerated efforts; Burkina Faso and Turkey have adopted campaign approaches that see each pulse of effort extending over a week or a month. Nigeria's outstanding achievements are based on a centrifugal radiation of district EPI efforts involving multiple sectors. Many countries will be adopting combination approaches, with high visibility initial campaigns tied solidly to expansion of health EPI infrastructures.

This diversity of approaches is surely a healthy one, and will, I believe, lead us out of the most contentious current issue that troubles us all—perhaps best simplistically stated as the "campaign" versus the "infrastructure-development" approach. I shall have more to say about this later.

Another feature of diversity in the great acceleration of the past year or so, especially with regard to campaign-style approaches, involves single-, multiple-, or all-EPI-antigen programmes. The trade-offs here are complex. Clearly a single-antigen campaign is not cost-effective compared to a multiple-antigen; clearly a single-antigen approach can lead to diversion of attention (and resources) from other important antigens. We all know the very dangerous consequences of failure of a single-antigen measles campaign. But, on the other hand, a dramatic single-antigen polio campaign can mobilize political and mass public support, and Brazil and other countries have shown how this can be a springboard to succeeding multiple-antigen campaigns. Carlyle Guerra de Macedo and PAHO/WHO have chosen the goal of polio elimination as just such a springboard for EPI in the hemisphere, while constantly stressing the need *not* to separate polio from the rest of the programme.

On the whole, I suspect that most health professionals such as myself are very tentative about single-antigen programmes, while most politicians find them extremely attractive. We ought to have significant debate at this conference, and in follow-up to it, to try to analyze these trade-offs—not as abstractions, but as they apply to real world situations.

As you all know, one of the most important concerns underlying both the issue of "campaign versus infrastructure approach" and the issue of single- versus multiple-antigen campaigns is the concern over "sustainability"—long-term growth and follow-up of immunization efforts, and, derivative to that, of using EPI to foster broader primary health care activities. Here I think it can be argued that the experience of the past two years is an encouraging one. A number of countries, Brazil and the Dominican Republic being only two examples, have used single-antigen (polio) campaigns as springboards to multiple-antigen campaigns. A number of countries, Burkina Faso, El Salvador and Turkey being only three examples, have used the initial campaign as a catalyst for realistic planning and action for expanded EPI infrastructure. Other countries, our Colombian hosts being one outstanding example, have used an EPI campaign as a first step towards the articulation and implementation of a broader acceleration of primary health care.

Some costing forecasts

In the past year we have learned much, and continue to learn at an accelerating rate, about the production, distribution and cost parameters of vaccines and supplies for this global acceleration. Tables 2, 3 and 4 give an indication that we are beginning—indeed are forced—to programme our procurement and distribution logistics on a rapidly changing global matrix. Our ability to do this is improving rapidly.

TABLE 2

EPI vaccines supplied by UNICEF during 1982-1984 and estimated supply volumes for 1985-1990 (millions of doses)

Year	DPT	TT	DT	Measles	Polio	BCG	Total
1982	30.0	22.0	4.0	9.0	24.0	35.7	124.7
1983	43.0	23.1	7.7	11.4	26.4	35.7	147.3
1984	63.9	30.5	27.3	27.7	80.5	46.7	276.6
1985	111.0	38.0	18.5	49.0	137.0	60.0	413.5
1986	138.0	47.0	23.0	61.0	171.0	75.0	515.0
1987	175.0	58.0	27.0	80.0	214.0	94.0	648.0
1988	220.0	72.0	35.0	100.0	270.0	113.0	813.0
1989	280.0	90.0	40.0	125.0	340.0	150.0	1,025.0
1990	340.0	115.0	50.0	160.0	440.0	183.0	1,288.0

The above projections for 1985-1990 are best estimates and subject to considerable changes in future.

Source: UNICEF, Supply Division projections.

TABLE 3

Cost summary of vaccines supplied and forecast to 1990 (US dollars thousands)

Year	DPT	TT	DT	Measles	Polio	BCG	Total
1982	720	308	90	774	648	2,287	4,827
1983	817	289	134	855	514	1,965	4,576
1984	1,022	321	340	1,666	1,410	1,820	6,581
1985	1,776	399	261	3,381	2,946	4,440	13,203
1986	2,429	545	347	4,623	4,053	6,105	18,102
1987	3,395	737	448	6,680	5,564	8,413	25,237
1988	4,686	1,008	641	9,188	7,722	11,623	34,868
1989	6,552	1,386	804	12,625	10,710	16,245	48,322
1990	8,772	1,944	1,105	17,776	15,224	21,814	66,635

We are projecting a 10% yearly increase in cost of vaccines due to both expected capacity problems and exchange rate changes.

Source: UNICEF, Supply Division projections.

TABLE 4

Associated supply costs

Most of the costs of vaccination are incurred in areas other than purchasing the vaccines. They range from fairly predictable to highly unpredictable and are dependent upon country, climate and infrastructure development.

Fairly predictable costs

Vaccine freight: cost of shipping from supplier to receiving country varies with respective locations. It must be airfreighted because of inherent vaccine characteristics. From recent experience, shipping to 70 different countries will add 25% to the cost of the vaccines.

Vaccine freight, supplies to receiving country: US$ 8.05/1,000 doses.

Syringe needle sterilization: costs depend on whether reusable or disposable equipment is used. WHO/EPI advocates reusables with sterilization kits because of uncontrollable reuse of disposables in developing countries. From recent experience, UNICEF cost per 1,000 doses shipped for syringes/needles has been:

	Cost per 1,000 syringes	Cost per 1,000 doses delivered
Disposable syringes	US$ 40.00	US$ 40.00
Disposable freight*	US$ 40.00	US$ 40.00
Total cost disposable syringes	US$ 80.00	US$ 80.00
Reusable plastic syringes	US$ 600.00**	US$ 3.00
Reusable freight	US$ 60.00	US$ 30.00
Total cost reusable plastic syringes	US$ 660.00	US$ 33.00

* Usually are rush orders that require airfreight.

** Assumes reusable plastic syringes have a useful life of 200 immunizations, therefore initially high unit cost (US$0.66 vs. disposable US$0.08) is more than offset by its repeated use and greatly improved safety.

Highly variable costs

Cold chain, in-country distribution, personnel costs, promotion: not predictable by UNICEF Supply Division.

Some specific lessons learned

What are some of the specific lessons we are learning? We are confident that world vaccine production capacity can meet the acceleration demands—*if* properly programmed with four to six months lead-time regarding any individual country's programme requirements. We are increasingly sure of our estimates that external donor costs to reach the 1990 objective are in the range of US$ 100 to US$ 150 million annually over the next five years, additional to what is now available—a modest and achievable requirement in relative terms.

Production and distribution capacity

But there are also some difficult lessons being learned. One is that the production and distribution capacity of supplies and equipment *other than vaccines* may well produce serious bottlenecks in the next two years—particularly with regard to cold chain equipment in the face of accelerated programmes in the "giant" countries. We are also learning that we badly need (all of us—multilaterals, bilaterals, countries, and private organizations) to take a more thorough and scholarly look at the recurrent cost issues, short- and long-term, for EPI and associated primary health care. Neither donor nor recipient groups have as yet squarely faced the recurrent cost issues.

Mobilization of external resources

In the area of mobilization of donor resources, the past year has been a positive one. Many of the bilateral and private agencies attending this conference have generously increased their contributions to EPI efforts, both through their own programmes and through contributions to UNICEF, WHO, UNDP, and World Bank activities. The multilaterals themselves have increased their levels of effort. With increased leverage in the coming year produced by the linking of the 40th anniversary of the United Nations and the goal of universal child immunization by 1990—a letter from the secretary-general of the United

Nations has been sent to the heads of state concerning universal child immunization by 1990—and with proposals for mobilizing increased contributions from the private as well as public sectors, I think we can be confident that our financial objectives are feasible—though they will require vigorous and prolonged effort.

Social mobilization

Perhaps the most extraordinary of the lessons learned through the experience of EPI acceleration in the past two years has been what we are learning about social mobilization—ranging from the engagement of national level political commitment and leverage, to the mobilization of multiple sectors within government bureaucracies, to the enlisting of diverse groups in the private sector and general community, to the creation of effective demand for immunization on the part of mothers and families themselves. This has reached the stage, or is at least rapidly reaching the stage, where the drive for universal child immunization by 1990 is taking on the characteristics of a world movement—a global mobilization of awareness and effort.

This mobilization phenomenon—utilizing a vast array of available methods of communications, from state-of-the-art to traditional village technology—is providing the EPI acceleration with something that public health professionals have often reached for, but seldom achieved, the ability to transform *health programmes* into *social movements*. In my own view, it is here that the vital link between EPI and primary health care and the "Health for all by the year 2000" strategy is to be found.

This then is a brief review of the experience gained over the past year or two. I have deliberately omitted consideration of research and technology-development issues, as they will be covered in several presentations on the second day of the conference. Let me turn more directly now to a further look at lessons learned (or not yet learned) through some of the major issues that have arisen. What major issues have arisen? What has been learned?

First assessments of accelerated efforts

It is clearly "early days" yet regarding epidemiological assessment—either in coverage or disease-reduction terms—of the acceleration of EPI programmes. We do know that very much larger proportions of children have been fully immunized in a number of countries.

Ralph Henderson, director, EPI, WHO, has provided the latest available—but by no means always current—coverage figures in his paper. Tables 5 and 6 portray much the same data in slightly different form. We also have the growing list of Joint WHO/UNICEF Country EPI Reviews. More recently, we have "Rapid Appraisals" of *accelerated* EPI programmes (in Burkina Faso, Colombia, and Nigeria)—which are available at this conference and are valuable adjuncts to this presentation. A Rapid Assessment of the El Salvador campaign will be available.

But just as we do not yet have fully satisfactory knowledge of morbidity and mortality effects, we have even less *comparative* material bearing on the relative strengths and weaknesses of different approaches to accelerated programming. The Rapid Assessments are only beginning to give us a very valuable glimpse into the lessons of *process* of various campaign strategies so far.

TABLE 5

Immunization coverage around 1983 (percentages)

	1-year-olds				Pregnant women
	BCG	DPT 3	Polio 3	Measles	Tetanus 2
Developing countries*	39	38	33	25	20
Africa	39	32	32	33	19
Latin America	59	49	73	65	13
South and East Asia	34	37	23	9	24
West Asia	49	43	47	46	5
Developed countries	83	84	93	85	—

* Excluding China
West Asia = Asia west of Iran
South and East Asia = Asia other than west of Iran

In some countries DPT and polio are given for two doses only and measles after 12 months.

Sources: UNICEF and WHO data

TABLE 6

Developing country deaths from selected vaccine-preventable diseases, 1983*

	Estimated number of annual deaths (in thousands)		
Country	Neonatal tetanus	Measles	Pertussis
India	288	745	171
Pakistan	126	155	33
Bangladesh	113	165	55
Indonesia	68	208	61
Nigeria	61	163	54
All other	258	652	214
Total	914	2,088	608

* Excluding China.

The same five countries account for 65 to 72% of these deaths.

Source: WHO data.

As always in international health, we need more and better evaluative data, especially comparative data, on both process and outcome questions.

Nonetheless, all such evidence as we have so far, points to some strong trends:

- coverage can be rapidly increased by accelerated programmes;
- morbidity and mortality from vaccine-preventable deaths are nearing a sharp break downwards on the curve in many countries (polio is by far the most advanced by disease, and Latin America by region);
- costs are of the order of magnitude that can be borne by most countries, with perhaps 20% external donor assistance; in the poorer countries, assistance will have to be continued well beyond 1990 to keep programmes in place;
- world vaccine production and logistics are adequate for the task; the greatest demands will come in 1986 and 1987, as many countries "catch up" with their unvaccinated under 5-year olds;
- country management and training remain high-priority long-

term problems, but are amenable to accelerated effort and innovative approaches;

- political and social mobilization can move EPI up to the top of the national health and social development agenda—at least for the short term.

Some further questions

Beyond these, our ability to take firm positions of lessons *learned* on the issues becomes rapidly more anecdotal and speculative. For how long (and through how many changes of national leadership) can high-level political support be sustained? To what extent can this mobilization always be translated into vigorous and determined programme action? How can multiple sectors be brought fully "in", without the health sector (which will, after all, carry the long-term programme) feeling "invaded" or "left out"? How can we assure that campaign efforts will strengthen, rather than undermine, long-term EPI infrastructure development? How can EPI itself nourish, and not starve by categorical diversion, broader primary health care development? Above all, will these accelerated efforts *sustain*?

It is far too early for anyone to answer these questions definitively, let alone with hard data. Our responses at this point must be necessarily anecdotal and impressionistic, although we can expect a flood of data over the next two years.

Trends in acceleration strategies

Nevertheless, the anecdotal and impressionistic data seem to this (admittedly not impartial) observer to justify some additional statements about lessons *being* learned.

1) Evidence to date in perhaps 20 countries suggests that political and social mobilization *can* be turned into effective accelerated programme outcomes.

2) Campaign strategies seem to develop a "positive programming momentum", leading countries to invest significant resources in their own longer-term EPI development. A successful immunization campaign seems to engender both *desire* and *confidence*, and to translate into both more aggressive performance by health ministries and persistent consumer demand by communities. I think it very likely that immunization campaigns are just not analogous to other past categorical efforts—such as malaria eradication campaigns—and thus are not at all likely to have predictably similar outcomes.

3) Campaign "versus" EPI infrastructure arguments may even fall into the category of "always interesting but seldom relevant". We should, and can, keep our eye upon the apple of *combined* approaches; we should insist on having the best of both possible worlds. We should recognize that there are many roads to Rome, and that these "global" issues are always only worked out in *country* programme solutions.

I would venture to say that two or three years from now we will wonder why we even argued with such theological fervour about "campaign" versus "infrastructure". The debate will have gone the way of "vertical" versus "horizontal" or "primary health care" versus "categorical programmes" that provided so much fuel for cold winter evenings in former years. We will learn to see these as partial and mutually-reinforcing solutions, as elements *within* a greater whole.

The joint WHO/UNICEF *Planning principles for accelerated immunization activities* are a first attempt by the two agencies to balance these two elements; this effort will undoubtedly grow and change shape over time (and in differing country contexts!), but I think we have made a start.

I am less sanguine about the issue of single-antigen campaigns, especially where they may be most tempting—i.e., in those countries where the epidemiological, political, or geographical contexts are least favourable to successful and sustained programmes. I believe we must be very cautious here, lest we dissipate resources and effort, and lose credibility for the overall endeavour. Perhaps the single-antigen campaign has its place in the *more* favourable country context—where extension to multiple-antigens and sustained programming can occur relatively quickly and with high probability of success of both efforts: in those circumstances the political appeal of single-antigen campaigns may be capitalized upon.

Main features of accelerated EPI programming

Let me end, thus, where perhaps I should have begun: by attempting a *definition* of *accelerated* EPI programming. We are clearly on our way, rolling with the tide, and the events of the past year or so ought to help us fill in the map of where we are headed, and how we want to get there.

An accelerated EPI country programme:

1) has as its objective the availability of immunization against the EPI diseases for all children in the nation by 1990;
2) builds upon the foundation of the EPI infrastructure that exists;
3) recognizes that political and social mobilization are in virtually all cases necessary pre-conditions to creating the energy and resources required to reach the 1990 objective;
4) enlists *all* available communications and advocacy methods of stimulating consumer demand for immunization;
5) employs whatever strategies for delivering services are applicable to the specific national context, while attempting to maximize the respective advantages, and minimize the respective disadvantages, of campaign and infrastructure-development approaches;
6) views campaigns as only a *first* acceleration of effort, never as a *substitute* for sustainable long-term immunization programmes;
7) views a long-term immunization programme as itself only a way station on the road to primary health care.

The Expanded Programme on Immunization

The 1974 Resolution by the World Health Assembly

The Twenty-seventh World Health Assembly,

Having considered the statement on immunization against the childhood diseases and the allocation of funds for an integrated programme on immunization contained in the proposed programme and budget estimates for 1975;

Recognizing the immense contribution immunization has made to the control of many of the common communicable diseases in the countries where it has been effectively applied;

Noting that in extensive regions of the world immunization is available for only a small proportion of children in the susceptible age groups;

Aware of the potential for disease control when a well-planned and well-coordinated programme is instituted;

Reaffirming the importance of systematic immunization programmes in all countries; and

Expressing its satisfaction at the readiness of the World Health Organization to further promote measures to assist countries in extending their immunization programmes to cover the greatest possible percentage of the susceptible populations,

1. RECOMMENDS that Member States develop or maintain immunization and surveillance programmes against some or all of the following diseases: diphtheria, pertussis, tetanus, measles, poliomyelitis, tuberculosis, smallpox and others, where applicable, according to the epidemiological situation in their respective countries;

2. REQUESTS the Director-General:
   (a) to intensify at all levels of the Organization its activities pertaining to the development of immunization programmes, especially for the developing countries;

(b) to assist Member States *(i)* in developing suitable programmes by providing technical advice on the use of vaccines and *(ii)* in assuring the availability of good-quality vaccines at reasonable cost;

(c) to study the possibilities of providing from international sources and agencies an increased supply of vaccines, equipment and transport and developing local competence to produce vaccines at the national level;

(d) to continue to support research on the efficacy of vaccines and on as yet unsolved practical problems encountered in immunization procedures;

(e) to arrange seminars and other educational activities on the design and execution of programmes; and

3. FURTHER REQUESTS the Director-General:

(a) to establish a special account under the Voluntary Fund for Health Promotion to be credited with the values of gifts intended for the expanded programme on immunization and to ensure that vaccines donated to the programme conform with the relevant WHO requirements;

(b) to report progress annually to the World Health Assembly.

Fourteenth Plenary Session, 23 May 1974

Overview

EPI: a global overview

Expanded Programme on Immunization
WHO, Geneva

The Expanded Programme on Immunization (EPI) has its basis in resolution WHA27.57, adopted by the World Health Assembly in May 1974. General programme policies, including the EPI goal of providing immunizations for all children of the world by 1990, were approved in resolution WHA30.53, adopted in May 1977. The importance of EPI as an essential component of maternal and child health and primary health care was emphasized in resolution WHA31.53, adopted in May 1978, and in the Declaration of Alma Ata in September 1978. In 1982, the Assembly warned that progress would have to be accelerated to meet the 1990 goal and urged member states to take action on a five-point action programme (resolution WHA35.31).

The EPI Global Advisory Group, meeting in Copenhagen in November 1985 to review the global status of EPI, recommended that, in furtherance of the five-point action programme endorsed by the 35th World Health Assembly in 1982, three general and four specific actions be taken by national programmes, supported by WHO, to accelerate EPI progress. It also recommended that the World Health Assembly to be held in April 1986 should reaffirm its commitment to meet the 1990 EPI goal.

Excerpted from *Expanded Programme on Immunization*, report presented at the 77th Session of the WHO Executive Board on 16 January 1986, Geneva, EB77/27, 19 Novembre 1985, and from *Global overview: the Expanded Programme on Immunization*, paper presented at the Conference on Protecting the World's Children (Bellagio II), Cartagena, Colombia, 14-16 October 1985.

Assignment Children, vol. no. 69/72, 1985

Origin of EPI

Immunization is one of the most cost-effective of all health services. It remains tragically underutilized. In the developing world excluding China, less than 40% of infants receive a third dose of DPT or polio vaccines. Coverage with measles vaccine is only about half that for DPT and polio, in part because it is only now being introduced in some programmes. These coverage levels still permit over 3 million children to die annually from measles, neonatal tetanus and whooping cough and over a quarter of a million children to be crippled by poliomyelitis. It may be easier to grasp these numbers by realizing they mean that for every breath one takes, a child dies from a vaccine-preventable disease.

To address this problem, EPI was established by WHO in 1974. At that time, although the smallpox eradication programme was well on its way to success, immunization efforts using other vaccines in developing countries were sporadic, producing negligible sustained coverage of children in their first year of life and no impact on the incidence of disease. It was widely assumed that poliomyelitis was not a problem in developing countries and that measles was mainly a problem of Africa. Neonatal tetanus was largely ignored. The information system required to estimate national and global levels of immunization coverage did not exist.

Immunizations are among the easiest of health services to provide. The delivery of immunization services is also easy to evaluate. If coverage is inadequate, that fact will be evidenced by the continued occurrence of the target diseases. Where they have previously been brought under control, a deterioration in coverage will soon be publicly announced by an epidemic of poliomyelitis or measles. Few other health programmes hold staff so visibly to high performance standards. Because immunization programmes are relatively easy to provide and easy to evaluate, they provide a good starting point to develop the management skills needed for more complicated programmes.

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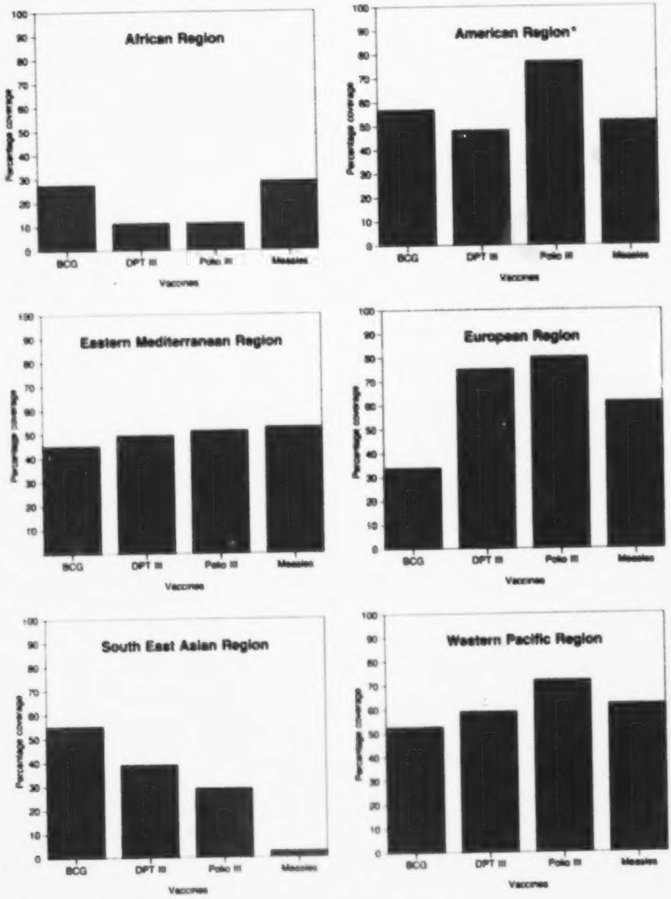
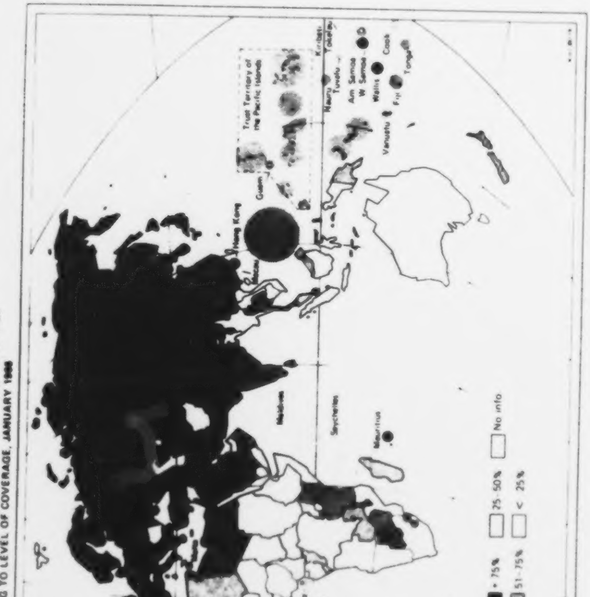
BCG, DPT III, polio III and measles vaccine coverage of infants, by WHO region, based on data available as of July 1985



* Excluding USA and Canada

IMMUNIZATION COVERAGE OF DPT3 OR POLIO 3 BY 12 MONTHS OF AGE
ACCORDING TO LEVEL OF COVERAGE, JANUARY 1986


French Polynesia
Cayman Is
Bahamas
Virgin Is (U.K.)
Turks
Montserrat
Bermuda
Anguilla
St Christopher
Antigua
Dominica
St Lucia
St Vincent
Barbados
Grenada
Trinidad & Tobago
Sao Tome
Cap Verde
Maldives
Seychelles
Mauritius
Hong Kong
Macau
Guam
Trust Territory of the Pacific Islands
Nauru
Tuvalu
Kiribati
Tokelau
Am Samoa
W Samoa
Wallis
Cook
Vanuatu
Fiji
Tonga
> 75%
51–75%
25–50%
< 25%
No info

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A building block for primary health care

From the beginning, EPI has been supported not only for its own sake, but has also been supported as a building block for primary health care. To be effective, immunization services must be continuously provided to a high proportion of children in their first year of life and to other susceptibles (such as women of childbearing age for tetanus toxoid). This implies the need for motivated health staff who are appropriately trained and supervised and who receive logistic support which assures that they have the needed vaccines and supplies when and where they are required.

The central EPI strategy to date has been to deliver immunization in consonance with other health services, particularly those directed toward mothers and children. The long-term goal of such efforts is to strengthen the health infrastructure so as to ensure the continuous provision of immunization and other primary health care services. First priority has been given to improving immunization in existing health services. And many simple things remain to be done.

Programme development

In developing EPI, WHO encouraged the strengthening of the national programme management. An active training programme was implemented and reinforced through programme monitoring and evaluation. Emphasis was placed on vaccine quality control and on using only those vaccines meeting WHO requirements. Data used for national programme monitoring formed a basis for regional and global information systems which were put in place. A method of national programme review was developed which permits a team of national and international staff to scrutinize the management and delivery of immunization services in a given programme and to recommend an action plan for its improvement. The review process has itself served as a powerful training tool for those involved, and is now being used to examine other primary health care interventions, often in combination with EPI. Epidemiological survey and outbreak investigation methods were developed and applied, and soon documented the high toll being taken in developing countries from measles, neonatal tetanus and poliomyelitis.

EPI would have made little progress without the early and active partnership of UNICEF. UNICEF has been a long-term supplier of vaccines and equipment to the developing world, and joined WHO in EPI in working to improve the management of existing programmes. A particularly fruitful area of joint collaboration has been in improving the materials used for the "cold chain", the system of maintaining vaccines at proper temperature from the point of manufacture to the point of use. By setting standards, by testing products and by purchasing only those found to be satisfactory, WHO and UNICEF provided incentives to manufacturers which have led to marked improvements in the quality and range of products now available. But UNICEF also joined in supporting national training initiatives and in supporting and participating in national programme reviews, and has provided an invaluable underpinning of vaccines and equipment to many programmes which would not be operational without them.

The need for a major acceleration effort

By 1982, EPI had grown from a collectively sponsored WHO initiative to being an operational programme of member states. But it was clear that, without major acceleration, the EPI goal would not be met. In reviewing the programme in that year, the World Health Assembly endorsed a five-point action programme which called for *1)* the promotion of EPI within the context of primary health care; *2)* the investment of adequate human resources; *3)* the investment of adequate financial resources; *4)* the ensurance of continuous programme evaluation and adaptation to achieve high coverage and maximum reduction in cases and deaths; *5)* the pursuit of research and development.

During this period, UNICEF dramatically increased its advocacy for a "child health revolution", using *The state of the world's children* report and other means to sensitize the world's political leaders to the silent pandemic of childhood deaths occurring in developing countries. UNICEF called for particularly vigorous action to promote growth monitoring, oral rehydration therapy for the treatment of diarrhoea, breast-feeding, immunization, food supplements, family spacing and female education.

In 1983, Professor Jonas Salk and the Honourable Robert S. McNamara offered their services in support of the immunization initiative, resulting in March 1984 in a conference sponsored by WHO, UNICEF, the World Bank and UNDP which was hosted by the Rockefeller Foundation in Bellagio, Italy. Its title was *Protecting the world's children: vaccines and immunization within primary health care*. Besides the heads of the sponsoring agencies, other participants included representatives of several major development agencies (generally the agency head), the minister of health of Senegal and representatives from Colombia and India. At the conclusion of the conference the sponsoring agencies and the Rockefeller Foundation joined to form a Task Force for Child Survival with the objective to promote the reduction of childhood morbidity and mortality through the acceleration of key primary health care activities, focusing initially on immunization.

A new thrust to implement the 1990 goal

A follow-up conference was held in October 1985 in Cartagena, Colombia. It was opened by Dr. Betancúr, president of Colombia. Some 80 persons attended, representing 10 developing countries, nine industrialized countries and six non-governmental organizations/foundations, in addition to members of the secretariat of the Task Force for Child Survival and its sponsoring organizations. The presentations underlined the remarkable progress which had been achieved since the previous conference. The potential for accelerating national programmes by mobilizing broad public and private support was underlined in reports from several countries, and was well illustrated by the experiences in Colombia. Limited managerial capacity remains a pervasive constraint. The challenge also exists of assuring that accelerated efforts strengthen the health infrastructure so as to achieve sustained improvements in the delivery of immunization and other primary health care services. Both basic and applied research merit increased support. Discussions conveyed optimism that the 1990 goal is achievable and that the needed additional national and international resources can be obtained. Appreciation was expressed for the work of the Task Force, which will be continued for at least an additional three-year period.

Commitment to the 1990 goal has also increased. It has accelerated the flow of resources to the programme, and has also been further strengthened by them. A recent demonstration of this commitment was the ceremony held in New York on 25 October 1985 in conjunction with celebrations commemorating the 40th anniversary of the United Nations. It involved the signing of a declaration reaffirming the commitment to achieve the 1990 immunization goal by governments and private representatives from some 57 countries, including some 20 presidents, prime ministers and foreign ministers/special envoys, and by the secretary-general of the United Nations and the president of the General Assembly.

Development of new strategies

Such commitment has encouraged national programmes to explore ways of rapidly increasing immunization coverage. One strategy is called "channelling" in Colombia: a respected member from the community and a health worker visit homes together, identifying eligible children, registering them for the programme and providing health education and motivation. In Madras, India, either a community member or a health worker perform such visits. Both approaches have been highly successful. Schools also represent a much-neglected resource. Health education for schoolchildren in Abidjan, Ivory Coast and Bombay, India, to cite but two examples, has been effective in increasing immunization coverage, as the schoolchildren have motivated their parents to ensure that younger children in the household are fully immunized. Efforts of the community for immunization have the potential to develop into support for primary health care as a whole.

National immunization days are being used as another way of accelerating programmes. They have already been successfully employed in some countries and are under active consideration in a number of others. When successful, they have obtained the support of national political leaders and, through them, mobilized broad multisectoral support for the programme. A strict counting of costs makes these efforts appear expensive but does not make it clear whether the investments actually reduce the resources available for other health programmes. Where communities have been fully mobilized, much time and material come in the form of donations. The enthusiasm captured by a national day is difficult to obtain by other means, and it is difficult to measure the extent to which this enthusiasm helps to reinforce the effective functioning of the health service as a whole. A major challenge in "national day" strategies is to ensure that efforts, including the involvement of communities, can be sustained, either by continuing the same strategy or by phasing it out as routine services increase their coverage. The "channelling" strategy mentioned above has been an important ingredient of success in both routine services and national days. It may provide an important link which can help assure the successful transition from one approach to the other.

The need for a long-term commitment in external resources

Now come some difficult questions, for the current enthusiasm for achieving the immunization goal by 1990 is real, and external resources, provided they continue to grow as they have in the recent past, do not at present seem to be a limiting constraint for programme operations. In countries with a relatively well developed, but underutilized, health infrastructure, the short-term stimulus provided by one or more national days may well have the potential to elicit a more sustained improvement of immunization services, the expectation being that this might extend to other health services as well. Much more will be known about these conjectures in two or three years, as experience is gained with these approaches.

But in the least developed countries in general, and in many other developing countries as well, at the present time there does not appear to be a likelihood of mobilizing before 1990 either the national budgets required to support the local costs required for full immunization coverage on a sustained basis or of devoting to the immunization services a sufficient number of competent national managers to be able to marry internal and external resources within effective programmes. In these countries, meeting the 1990 goal is likely to imply providing external funds to meet costs which have in the past been considered a national responsibility, including the provision of fuel, maintenance and repair costs, the provision of per diems to permit staff travel and even the provision of basic salary costs in some instances. And it is likely to imply the provision of external staff to help manage these programmes. In such countries, the external support may become dominant, posing a potential threat to national autonomy and perhaps to national development as well.

What, then, to suggest? To back away from the 1990 target date in a number of developing countries, restricting external support for immunization to a traditional 20% or so of the total cost? Or to press forward, working so as to avoid creating a continuous dependence on external resources, yet recognizing that few successful examples of such an approach are known to date? Neither option is a comfortable one, and it is likely that different countries will choose different paths. In those countries where a concerted effort is made using a large share of external resources, however, it will be important to assure that these resources are sustained. This means a period of 10 to 20 years rather than the more traditional planning horizon of three to five years. And to the degree that external managers are engaged, thought should be given not only to having national counterparts, but to using external funds to employ additional young national staff to serve for two to three years as apprentices to the external staff and their counterparts, giving such apprentices opportunities for relevant travel and training both within and outside of their home countries.

Acceleration of existing efforts constitutes the overriding priority for EPI at present. The approaches used for acceleration will need to differ according to the requirements of individual programmes. Common themes in many will be improving current services and increasing the partnership of communities in these services.

Recommendations of the EPI Global Advisory Group

The EPI Global Advisory Group met in November 1985 to review the global status of EPI in conjunction with detailed reports from each region, some of which included the conclusions and recommendations made by the regional committees in 1985. The Group also heard from other organizations increasingly involved in EPI on the national and international level. The Global Advisory Group recommends that, in furtherance of the five-point action programme endorsed by the 35th World Health Assembly in 1982,[1] three general and four specific actions be taken by national programmes, supported by WHO, to accelerate EPI progress. These recommendations reflect optimism that the 1990 goal of reducing morbidity and mortality by providing immunizations for all children of the world can be achieved, but also acknowledge that many fundamental problems of national programme management remain to be resolved. The recent increases in external support for EPI are welcome but accentuate the necessity for concomitant increases in national support for EPI and national abilities to implement programmes. Given the current financial crisis, it will be necessary in some countries for long-term external support to be provided, rather than the usual commitment of three to five years. External resources may be needed to support recurrent expenses of programmes (e.g., per diems for national supervisory staff, transport maintenance, and running costs).

As programmes achieve greater levels of immunization coverage, it becomes increasingly important for targets to be set for reductions in morbidity and mortality. Establishment of disease reduction targets will stimulate the organization of national surveillance systems which are at present lacking in many countries and which are required for achievement of these goals.

Three general actions needed

The three general actions needed are:

1. *Promote the achievement of the 1990 immunization goal at national and international levels through collaboration among ministries, organizations and individuals in both the public and private sectors.* Mobilize social action which creates effective consumer demand and which provides the sustained resources and incentives to assure that this demand is met rapidly and effectively.

2. *Adopt a mix of complementary strategies for programme acceleration.* In countries where coverage is unsatisfactory or disease transmission persists, use intensified approaches such as national immunization days to strengthen existing services and bring about rapid and sustained increases in immunization coverage. Such approaches (including national immunization days) should use all EPI antigens whenever possible and should also consider provision of tetanus toxoid to women of childbearing age. A single national day could be proclaimed, or a series of single days, several consecutive days, or weeks. The Joint WHO/UNICEF Statement *Planning principles for accelerated immunization activities* is a useful guide.

3. *Ensure that rapid increases in coverage can be sustained through mechanisms which strengthen the delivery of other primary health care interventions.* Accelerated efforts often represent extraordinary efforts. A major challenge will be to ensure that the progress made is maintained and that all immunization activities serve to strengthen the development of primary health care. Care must be taken to ensure complete immunization of all newborns on a continuing basis.

Four specific actions needed

The four specific actions needed are:

1. *Provide immunization at every contact point.* Immunization should be offered by all curative and preventive health services, even to children suffering from malnutrition or minor illness.

Health workers should review the immunization needs of mother and child and provide the right immunizations at the right time. To ensure maximum possible protection at minimum cost, simplified schedules should be used in keeping with national needs, and excessive contraindications should be removed.[2, 3] If it is not possible to offer immunizations at a particular contact, referral should be made to the first available opportunity.

2. *Reduce drop-out rates between first and last immunizations*. The measures recommended are to:

- determine the drop-out rate through systematic review of health facility records or surveys;
- identify reasons for non-participation and adopt measures to solve problems. Actions may include: *a)* strengthening the participation of communities in immunization programmes, including the public, private and voluntary sectors and schools; *b)* providing immunization services at more convenient times and places and increasing the use of regularly scheduled "outreach" clinics; *c)* better informing parents of the need to return for further immunization and of the times and places for doing so; *d)* better identifying children who are eligible for immunization and actively seeking out those who are missed.

3. *Improve immunization services to the disadvantaged in urban areas*. Half the population of the world is expected to live in large urban areas in the year 2000. Despite the relative abundance of health facilities and health personnel in urban as compared with rural areas, immunization coverage in the disadvantaged populations surrounding major cities is typically poor. High migration rates, lack of social cohesion, and friction between new immigrants and established authorities pose barriers which have proved difficult to overcome. Nonetheless, accessible services can be provided with few financial or logistic problems. Increased priority should be given to accomplishing this in the short term, while continuing efforts to provide more equitable services to rural areas.

4. *Increase priority for the control of measles, poliomyelitis and neonatal tetanus*. Measles causes the highest world-wide

mortality among the EPI target diseases. In some areas, however, coverage with measles vaccine is lower than with DPT or poliomyelitis vaccine. Children in the age group at highest risk for measles often have limited access to health facilities and health facilities themselves can be major sources of measles transmission. All sick and well children attending health facilities should be screened for measles vaccine eligibility and immunized on the spot if indicated. Efforts should be made to assure that measles vaccine is available on a daily basis at all health facilities seeing eligible children. A vial of vaccine should be opened even if only a single child attends. Health care providers should focus on every measles case as a learning opportunity to improve measles vaccine coverage. Increased emphasis on immunizing children against measles will not only help increase measles vaccination coverage, but will help raise coverage for DPT and poliomyelitis vaccinations, particularly second or third doses, as these can be given with measles vaccinations.

The crippling effects of poliomyelitis are known and feared in most communities where this disease persists. Global reductions in the reported incidence of poliomyelitis are already being recorded as a result of EPI and dramatic further reductions can be anticipated in coming years as immunization coverage improves. Administration of oral poliomyelitis vaccine as early as birth may assist in accelerating the reductions. Regional targets for elimination of poliomyelitis by 1990 have been set in the European and American Regions.

Very little progress has yet been achieved in the control of neonatal tetanus, which remains a neglected disease although it causes almost a million deaths a year. Cases can be prevented both by ensuring clean delivery and postnatal care and by maternal immunization. Each case testifies to multiple failures in maternal and child health care. This disease has disappeared from industrialized countries and should no longer be tolerated anywhere in the world.

Increased priority for the control of measles, poliomyelitis, and neonatal tetanus should not diminish emphasis on BCG and DPT immunization.

Continued efforts required also in other areas

Continued efforts are also required to:

- *strengthen disease surveillance and outbreak control*. The goal of EPI is to prevent disease and death. To assess the impact of EPI activities it is essential to have adequate disease surveillance systems and laboratory support. Similarly, it is important to have mechanisms to respond rapidly to disease outbreaks in order to limit spread. In places where routine surveillance systems are not adequate for programme management, sentinel surveillance should be vigorously pursued. Outbreak investigations should be increasingly promoted as the EPI target diseases are brought under control. Regional offices should support national programmes in ensuring that surveillance data are used to maximum effect by operational managers;
- *reinforce training and supervision*. Few countries have comprehensive plans for initial and refresher training of middle- and peripheral-level staff or encourage supervisory practices which motivate and help staff to do their best. Particular problems include high staff turnover and the need to train volunteers for selected "acceleration" activities;
- *ensure quality of vaccine production, management, and administration*. All vaccines used should meet WHO requirements; cold chain systems should be strengthened; and efforts must be made to ensure that each person to be immunized receives a vaccine properly administered (using a sterile needle and a sterile syringe, if an injectable product);
- *pursue research and development*. Emphasis should be placed on the evaluation of alternative approaches for delivering services more effectively, particularly those which directly strengthen other elements of primary health care, and on the incorporation of new methods and materials which promise to improve programme management.

WHO and UNICEF have actively collaborated in support of EPI since the early days of the programme. The acceleration of national efforts heightens the importance of this collaboration, particularly at national level. It may be further facilitated by the provision of policy guidance from global and regional levels (as exemplified by the *Planning principles for accelerated immuni-*

zation activities), by WHO and UNICEF collaborative agreements at regional level (as has been done in Africa, the Americas and the Eastern Mediterranean) and by country agreements jointly signed by government, WHO, UNICEF, and other major partners in the immunization effort. In addition, WHO and UNICEF should strive to coordinate administrative and budgetary procedures at country level.

References

[1] Resolution WHA35.31, 14 May 1982.

[2] A. M. Galazka et al., Indications and contraindications for vaccines used in the Expanded Programme on Immunization, *Bulletin of the World Health Organization*, vol. 62, no. 3, 1984, pp. 357-366.

[3] WHO, *Weekly Epidemiological Record*, vol. 60, 1985, pp. 13-16.

See Assignment Children, vol. no. 61/62, 1983, for:

- The 1982 resolution by the World Health Assembly, pp. 119-120.
- The EPI five-point action programme, pp. 121-122.

Pan American Health Organization

Resolution XXII
on poliomyelitis eradication in the Americas by 1990 adopted on 27 September 1985 at the 31st meeting of the Directing Council

Having considered the director's report on the Expanded Programme on Immunization (EPI) in the Americas and the report of the 95th meeting of the Executive Committee,

noting the overall improvement made at the national level in the implementation of this programme and the impact already achieved in reducing morbidity by poliomyelitis,

believing that an attempt to eradicate poliomyelitis presents a challenge and a stimulus to the world to mobilize the resources to achieve the objective, and that the support required is available nationally and internationally, and

recognizing that the realization of this objective will enhance the overall success of the EPI,

resolves

1. **to congratulate** the director on the report presented;

2. **to reassure** its full commitment to reach the overall goal of the EPI by 1990;

3. **to accept** the proposal for action for the eradication of indigenous transmission of wild poliovirus from the Americas by 1990 and declare the goals established in the proposal for action as one of the major objectives of the organization;

4. **to urge** member governments:

a) to take the necessary steps to accelerate their EPI programmes to assure the achievement of the overall objectives of the EPI and of the eradication of indigenous transmission of wild poliovirus from the Americas by 1990;

b) to make the needed commitment and allocate the necessary resources for programme implementation;

c) to promote support towards these goals within those technical and financial multilateral agencies of which they are also members;

5. to draw the attention of the member governments to the necessity that:

a) immunization programmes not be implemented at the expense of efforts to develop the infrastructure of health services and their overall promotion, prevention and care activities;

b) the strategy of campaigns and the tactic of national vaccination days be viewed as ad hoc measures, to be gradually replaced by regular immunization services performed routinely by health services;

6. to request the director:

a) to seek the additional political and material support needed for the realization of these goals from multilateral, bilateral and non-governmental agencies;

b) to initiate immediate action as outlined in the proposal for action to assure the necessary technical and financial support for the eradication of indigenous transmission of wild poliovirus from the Americas by 1990;

c) to submit a progress report to the 97th meeting of the Executive Committee and the XXII Pan American Sanitary Conference in 1986.

World Health Organization

Regional Committee for Africa

Resolution
passed on 17 September 1985
declaring 1986 African immunization year

The Regional Committee,

Having examined the report of the Regional Director on the *Expanded Programme on Immunization in the African Region: a mid-decade evaluation* (document AFR/RC35/21).

Considering resolution AFR/RC31/R14,

1) **approves** the Regional Director's report that provides a clear picture of the situation in regard to EPI in the African Region;

2) **appreciates** the substantial support for EPI given by other international, governmental and non-governmental organizations;

3) **invites** Member States to: step up implementation of EPI in compliance with the recommendations set out in the report and ensure that the objectives of the programme are achieved by 1990;

4) **declares** 1986 African immunization year, in the course of which Member States are invited to put into effect the mechanisms required to obtain vaccination coverage of the target populations;

5) **requests** the Regional Director to:

(i) strengthen collaboration with Member States to meet the 1990 deadline, giving priority to programme management, logistics and the cold chain;

(ii) enhance, in collaboration with UNICEF and the other agencies of the United Nations system, the coordination, mobilization and utilization of resources intended for EPI implementation;

(iii) transmit this report as the contribution of the African Region to the Director-General's progress report to the Executive Board and the World Health Assembly;

(iv) continue to report to the Regional Committee on the progress made by the programme towards attaining the social goal of Health for all by the year 2000;

6) **commends** the Regional Director for his efforts to strengthen national immunization programmes.

Pledges

Pledges
for universal child immunization

On 25 October 1985, on the occasion of the celebration of the 40th anniversary of the United Nations, leaders of many nations and of non-governmental organizations joined senior United Nations officials in pledging their commitment to immunize children world-wide by 1990 against six major diseases. Leading the signatories to the declaration, the secretary-general stated that the universal immunization of children "could provide a crucial element in making possible the Child Survival and Development Revolution which may well become one of the lasting achievements of the United Nations system. This most impressive gathering . . . is testimony to the marshalling of the necessary will on the part of governments to make this revolution a reality".

In response, those assembled pledged their support to universal child immunization by 1990, and many immediately signed the declaration of intent "We the peoples". The names of those who signed the declaration on that day are reproduced below. The ceremony received wide press coverage and replicas of the declaration are continuing to be signed world-wide as awareness increases and support for this goal builds up.

Following the official pledging ceremony, a symposium on partnership for action was organized by the NGO Committee on UNICEF to promote cooperation in efforts to achieve the 1990 goal and to examine ways of encouraging greater involvement of private voluntary organizations in national immunization programmes.

Assignment Children, vol. no. 69/72, 1985

We the peoples

Determined: to save succeeding generations from the scourge of preventable diseases which today claim the lives of over 3.5 million children each year and permanently disable 3.5 million more,

and to promote social progress and better standards of life in larger freedom by providing access to vaccines which immunize children against the killer diseases of measles, diphtheria, whooping cough, tetanus, tuberculosis and polio,

and for these ends to unite our strength as governments and non-governmental organizations, institutions and concerned individuals, and to employ international machinery for the promotion of the economic and social advancement of all peoples, and particularly for the protection of our children;

have resolved to combine our efforts to accomplish these aims, and to achieve the United Nations' goal of

universal child immunization by the year 1990

. . . an essential step in establishment of sustainable Primary Health Care services and structures for the continuing protection of the world's children and families, leading to achievement of the United Nations' goal of Health for All by the Year 2000;

and do consider this renewed commitment a fitting commemoration of the Fortieth Anniversary of the United Nations.

We the peoples

The respective Governments, through Heads of State and representatives assembled in the city of New York on the occasion of the Fortieth Anniversary of the Charter of the United Nations, have agreed that the safety and welfare of children is an investment in the future of all mankind, and have called for the full implementation of the worldwide programme of universal child immunization by 1990.

In witness whereof, we hereunto set our hands.

H. E. Mr Jaime de Piniés	President of the General Assembly of the United Nations
H. E. Mr Javier Pérez de Cuéllar	Secretary-General of the United Nations
H. E. Mr Radovan Vlajkovic	President of the Presidency of the Socialist Federal Republic of Yugoslavia
H. E. Mr Spyros Kyprianou	President of the Republic of Cyprus
The Right Honourable Brian Mulroney	Prime Minister of Canada
H. E. Mr Olof Palme	Prime Minister of Sweden
H. E. Mr Turgut Özal	Prime Minister of Turkey
The Honourable Ranasinghe Premadasa	Prime Minister of the Democratic Socialist Republic of Sri Lanka
The Right Honourable Abraham Waligo	Prime Minister of Uganda
H. E. Mr Zhao Ziyang	Prime Minister of China
H. E. Mr Poul Schlüter	Prime Minister of Denmark
H. E. Mr Bettino Craxi	Prime Minister of Italy

H. E. Mr Tadeusz Mlynczk	Vice-President of the Council of State of the Polish People's Republic and Special Envoy
H. E. Mr Justice Daniel Annan	Vice-President of Ghana
H. E. Mr Dawa Tsering	Minister for Foreign Affairs and Special Envoy, Bhutan
H. E. Dr Mochtar Kusumaatmadja	Minister for Foreign Affairs and Special Envoy, Indonesia
H. E. Mr Svenn Stray	Minister for Foreign Affairs and Special Envoy, Norway
H. E. Mr Goshu Wolde	Minister for Foreign Affairs and Special Envoy, Ethiopia
H. E. Mr Bali Ram Bhagat	Minister for Foreign Affairs and Special Envoy, India
H. E. Mr Paavo Väyrynen	Minister for Foreign Affairs, Finland
H. E. Mr Qian Qichen	Vice-Minister for Foreign Affairs, China
H. E. Mr Gerardo Trejos	Vice-Minister for Foreign Affairs, Costa Rica
H. E. Mr Claude de Kemoularia	Permanent Representative to the United Nations, France
The Honourable Shridath Ramphal	Secretary-General, Commonwealth Secretariat
Mr Anwarul K. Chowdhury	Chairman, Executive Board of UNICEF
Mr James P. Grant	Executive Director of UNICEF
Dr Farouk Partow	Assistant-Director-General, World Health Organization

We the peoples

As representatives of Non-Governmental Organizations and interested institutions and private individuals committed to the well-being of the world's children, we do hereby pledge our best efforts in collaboration with Governments and the United Nations to assure the achievement of universal child immunization by 1990.

In witness whereof, we hereunto set our hands.

Canon Moerman	President of the Non-Governmental Organizations Committee on UNICEF
Mr Joel Grey	Citizen of the World
Ms Mary Dewar	Representative to UNICEF of the International Council of Nurses
Dr Michael Gerber	Executive Director, American Medical and Research Foundation
Mr David Guyer	President, Save the Children Alliance
Dr Robert Haggerty	American Academy of Pediatrics, International Pediatric Association
Dr Jean-Pierre Hocké	Representative, International Committee of the Red Cross
Dr Bernard Lown	Nobel Peace Prize Winner, International Physicians for the Prevention of Nuclear War
Mr Herbert Pigman	General Secretary, Rotary International
Ms Annabelle Wiener	Director, World Federation of United Nations Associations
Ms Martin Luther King	
Mr Ramsey Clark	Disarmament Education Fund

The biotechnology revolution and new vaccines

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The author reviews the principles underlying immunization and explains the basis of currently available vaccines. He then describes two new biotechnologies, namely peptide synthesis and genetic engineering, which have the capacity to produce both molecular vaccines and live, attenuated vaccines, of an extraordinary range. He mentions the limitations in the strength of some of the experimental vaccines and research being performed to overcome these.

Examples are given of some of the vaccines in the research pipeline—such as those against malaria, hepatitis B and a variety of diarrhoeal diseases including typhoid, cholera and bacillary dysentery. He makes reference to new ways of using old vaccines, such as an inhaled aerosolized version of the measles vaccine.

Vaccines are the most cost-effective public health tool in history. Yet, curiously, vaccine research has had a distinctly fluctuating character. There was, of course, a first burst in the late eighteenth-early nineteenth century following Jenner's discovery of a smallpox vaccine in 1796. Then came a long gap

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Reproduced from *Protecting the world's children: vaccines and immunization within primary health care, a Bellagio Conference, March 13-15, 1984*, The Rockefeller Foundation, New York, June 1984, pp. 39-66.

until Pasteur's work in the late nineteenth century ushered in the first golden age of immunology. By 1930, many of the antibacterial vaccines were in place. The third triumphant surge of activity in the early 1950s brought us vaccines against poliomyelitis. Magnificent though these achievements have been, many gaps remain. The vaccines against diarrhoeal diseases such as cholera, typhoid and paratyphoid are only partially effective. BCG, for whatever reason, has not controlled tuberculosis in the developing countries. The early, heady enthusiasm about immunological control of most cancers was grossly premature. Worst of all, research has not provided a vaccine against any of the parasitic diseases, such as malaria or schistosomiasis, that wreak such devastation in the tropical countries.

Now, without doubt, we are on the threshold of another major revolution in vaccine research, comparable or even exceeding in its scope the era that began when the poliomyelitis virus was first grown in tissue culture. As then, the developments in the pipeline rest on powerful new technologies provided through fundamental research. New vaccines will alone provide a justification for the resources that have been poured into biotechnology.

The purpose of this brief paper is to communicate at least some of the excitement that is sweeping through academia at the moment about the prospects for new and improved vaccines, and thus to ensure from the outset that the Consultative Group to Protect the World's Children embraces vaccine research into its orbit. As successful vaccines come on stream, crucial decisions will have to be taken concerning which ones are to be incorporated into the various immunization programmes. The sooner a capacity to think about these issues develops within the Consultative Group, the better, because some of the new vaccines may be of even greater public health importance than the six presently within the purview of the WHO Expanded Programme on Immunization (EPI).

The paper addresses a variety of vaccine developments in a way that is not too technical. It is designed for the non-scientists at the Bellagio meeting. I beg the indulgence of scientists and physicians for the many oversimplifications, which are intentional.

Principles of successful immunization

The immune system is nature's way of defending vertebrate species against infectious diseases. Tragic examples of what happens when the immune system fails are seen in various disease states, for example congenital immune deficiency or the curious acquired immune deficiency syndrome (AIDS). The end result is death, usually within less than two years. In the natural situation, the immune system is provoked to form antibodies to foreign organisms that enter the body and multiply within it. Sometimes these antibodies are formed too late, and the patient dies of the infection. On other occasions, the organism concerned has, through evolution, devised clever tricks of evading the host's defences, and a chronic disease like tuberculosis or schistosomiasis results despite the formation of antibodies. Very frequently, however, the antibodies both vanquish the first infection and leave the patient immune against that particular disease for long periods or even for life.

The key principle which unites all forms of successful immunization is to devise a way in which the formation of antibodies and other cellular processes contributing to immunity can be provoked without the person or animal concerned having to run through the gamut of an actual infection. In the best cases, this leaves a specific immunity just as good as that enjoyed by a recovered patient. With some other vaccines, the protection is less perfect but still substantial, so the risk of getting the relevant infection is much reduced and the disease itself less severe in those cases that do come down with it. The reason that immunization can work is that the cells that make antibodies, white blood cells called lymphocytes, need not interact with living, virulent micro-organisms. The capacity of the lymphocytes to form the protective antibodies is triggered when they encounter specific molecules coming from the foreign invader. These molecules are known as antigens. So all immunization involves introducing antigens into the body in a risk-free manner.

Broadly speaking, immunization can be accomplished in one of three ways.

- The first, which Jenner stumbled across in 1796, was developed much further by Louis Pasteur. It is to achieve attenuation of virulence for the human host, either by finding a harmless relative of a virulent organism, or by intentionally changing its characteristics through prolonged culture outside the body or passage through different host animals. The harmless, mutated organism is then allowed to grow and multiply within the body. Such live, attenuated vaccines work because the harmless relative and the virulent organism share one or more antigens, and therefore the antibodies against the relative can also attack the real organism when it comes along.

- The second method involves killing the virulent organism, for example with formalin, and injecting it into the body. The antigen molecules from these killed organisms can be effective at surprisingly low doses, as the brilliant success of the Salk poliomyelitis vaccine proved. However, killed vaccines are usually given as two or more injections to ensure that the stimulus to the immune system is sufficiently strong.
- The third method is of the greatest relevance to this paper. It rests on the fact that one does not have to be immune to every antigen of a microbe in order to be protected. One can therefore inject some component of the micro-organism rather than the entire living or killed microbe. The current highly successful diphtheria and tetanus vaccines work on this principle. In those cases, the operative antigen is a modified version of a toxin that the relevant bacteria produce, but in other cases the antigen might, for example, be a molecule sitting on the outer wall of the bacterium. The purer such molecular vaccines are, the less likely they are to have irritating or dangerous side-effects.

Principles of vaccine manufacture

Until very recently, all vaccine manufacture has involved the large scale growth of the responsible organism, or its harmless relative, under controlled laboratory conditions. For bacterial vaccines, like those against pertussis, tetanus or diphtheria, this is relatively straightforward as bacteria can grow in nutrient broths rather like a rich meat soup. For viral vaccines, the technology is more demanding. Viruses can only grow inside a living cell. So, the vaccine has to be prepared either in living animals (the skin of calves for the smallpox vaccine, or the inner linings of a chick embryo for the yellow fever vaccine) or, more usually, in mammalian cells that are themselves growing under artificial conditions through the technique of tissue culture.

A great deal of technology has to go into conventional vaccine manufacture. Obviously, the growth medium must not become contaminated with even one irrelevant micro-organism, so superb aseptic techniques must be used. The work force must be carefully protected from dangerous bacteria or viruses. For killed vaccines, every last microbe must be killed. For live, attenuated vaccines, the organisms must not be allowed to die. For molecular vaccines, the right antigen must be purified from all the irrelevant material. Quality control procedures must be stringent, and each vaccine batch must be tested for safety and efficacy. All this adds to costs.

The potential of biotechnology in vaccine manufacture

Modern biotechnological advances have unblocked the central bottleneck in vaccine manufacture, namely the need to grow vast quantities of pure virulent organisms. Two separate methods are involved, and indeed are seen by many as competing with each other. The one is to synthesize antigens chemically. The other is to force harmless, easy-to-grow bacteria or yeast to make antigens through genetic engineering.

The synthetic approach involves simply making antigens in the test tube from simple chemical building blocks. Many antigens are proteins. Proteins are strings of smaller molecules, the amino acids, hooked together in a particular sequence. In many cases, it is not necessary to inject a whole, intact antigen molecule in order to induce a good immune response. One little corner of a protein, say a peptide 10 amino acids in length, may suffice to give protection, though, as we shall see, some tricks have to be used to make this work. Whole protein molecules can be made synthetically from amino acids, but the bigger the protein, the greater the risk of introducing an error into the sequence and the more cumbersome the synthesis. These difficulties mean that, in practice, synthetic proteins are 50 or less amino acids long. So, much emphasis is going into defining "immunodominant" portions of large antigens of medical importance—smaller bits of proteins called peptides, usually eight to 20 amino acids long.

Genetic engineering harnesses living organisms to mass produce antigens vicariously. Proteins are synthesized as a linear array of amino acids according to the blueprint of a linear array of coding units, the DNA, or gene. One gene codes for one protein; one fragment of a gene codes for the corresponding fragment of the protein. It is now possible to cut out the gene for a particular protein, say of a virus, and transplant that gene into a fast-growing microbe, say the harmless intestinal bacterium, *Escherichia coli*. Moreover, the gene can be forced to "work much harder" than it does in its normal state, so that 10% or more by weight of the *E. coli* represents the single pure protein of interest. The transplanted gene can be big or small, so that the protein made can be of almost any desired size. Of course, it is still necessary to purify the protein made by genetic engineering from all the other molecules inside the *E. coli*. Biotechnology has solved this problem, as it is possible to make monoclonal antibodies against the protein and to use these as a tool in elegant and cheap purification methods.

Advantages and disadvantages of the two most commonly used biotechnologies for vaccine development and production

Both the peptide synthesis and the recombinant DNA approaches have their ardent proponents. What is not revealed in many such discussions is that the two technologies are very interactive: genetic engineering may be the way to find the small piece of protein that you eventually wish to synthesize, and testing immune responses against small synthetic antigens may help you to validate the importance of a particular large antigen, that you then make through genetic engineering. In practice, many laboratories probing for new vaccines use both technologies in their research. Nevertheless, each approach has its own special advantages and disadvantages.

As mentioned, the synthetic approach is practically limited to proteins of circa 50 amino acids or less, and in fact most work with synthetic peptide antigens has used pieces of eight to 20 amino acids. Intact protein antigens, on the other hand, are usually 100 to 2,000 amino acids long. In nature, these long protein chains assume a highly distinctive and predictable but complex and contorted folding, assuming a three-dimensional shape where amino acids that are far separated in the sequential array may, in fact, lie quite close to each other. It was thus predicted that most antigenic sites would be conformational, i.e., requiring the whole protein to display its full shape. In the event, short peptides, particularly those corresponding to the surface of the protein, can be injected and cause the production of antibody reactive with the whole intact molecule.[1, 2, 3] Moreover, a chemically synthesized peptide 20 amino acids in length coming from the immunologically most important section of a particular antigen of the foot and mouth disease virus was capable of protecting guinea pigs against virulent virus.[4] In fact, on a weight-for-weight basis, this peptide worked much better than the whole protein of 213 amino acids. Similarly, short peptides from influenza or hepatitis virus antigens cause excellent antibody formation. While much work remains to be done to see how general this finding will be, approaches devised recently to predict the immunologically most important portions of an antigen show great promise.[1, 5]

It may be, therefore, that the most serious potential disadvantage of synthetic peptide vaccines, namely their failure to reflect the antigens of the whole molecule, will turn out to be illusory. Nevertheless, there is one biological constraint that may not have received enough attention. Micro-organisms show a great ability to change and evolve. If a vaccine is directed against just one tiny portion of one antigenic molecule, there is a real risk that the microbe concerned would mutate in such a manner as to change that one component of its make-up, and thereby elude the host immune response. To combat this possibility, synthetic vaccines should probably be cocktails of several different peptides.

A second disadvantage of synthetic vaccines relates to their strength as antigens. Living or killed micro-organisms frequently present antigens to the immune system as a bristling array of hundreds or thousands of molecules packed closely together on the surface of the microbe. This, for technical reasons which need not detain us, increases the intensity of the immune response.[6] Furthermore, the micro-particulate nature of micro-organisms makes them palatable to the scavenger cells of the body, and scavenger cell-associated antigen is a much more powerful trigger to the immune system than soluble antigen. In experimental situations, these disadvantages are overcome by the use of powerful stimulants of the immune system, called adjuvants, which are given with the synthetic vaccine. Most adjuvants are not suitable for human use because of toxicity and side-effects. For this reason, interest attaches to a group of synthetic molecular adjuvants that are being developed at the *Institut Pasteur* in Paris, the muramyl dipeptides and their analogues.[7, 8] However, these are also not free from toxicity. Other approaches under investigation include old-fashioned ones such as adsorbing the synthetic vaccine onto aluminium hydroxide particles ("alum precipitation") to achieve a slow release effect; or newer methods of coupling of the synthetic peptide onto a "carrier" molecule which is itself a strong antigen. Research aimed at strengthening immune responses deserves to be promoted, as it is common to all synthetic vaccines and indeed to the recombinant DNA approach as well.

A third disadvantage of synthetic vaccines may be their cost, which presently is well ahead of that of genetically engineered proteins. It is probable that costs will come down sharply as production technology improves.

The major advantages of synthetic vaccines relate to their precision as chemical entities. There should be a minimum of batch variation and of unwanted side-effects due to molecules not germane to the desired immune response.

The genetic engineering approach can make proteins of essentially any length, although most of the proteins that have been successfully made so far are less than 1,000 amino acids long. Theoretical problems of finding the best part of an antigen molecule are thereby largely avoided, although it may still be wise to use a cocktail of different molecules. Genetically engineered vaccines need not be confined to one protein—it is possible to insert several genes and have them function in *E. coli*, thus making the bacteria into factories for ready-made cocktails. The Cetus Corporation has marketed a vaccine against scours, a toxic diarrhoea of swine, based on this principle. The Genentech group have produced a foot and mouth disease vaccine, which works in cattle, through genetically engineering the viral protein VP1.

A further, and somewhat *avant-garde*, advantage of genetic engineering is that potentially the DNA coding for the relevant antigens can be engineered into a living microbe which could actually grow inside the host being immunized, thus making a genetically engineered live, attenuated vaccine with all the attendant advantages of dosage and duration of antigenic stimulation. For example, Moss has successfully engineered the cowpox virus, the very agent responsible for the global eradication of smallpox, to act as a carrier for several antigens.[9, 10] Harmless gut micro-organisms can also be engineered to carry non-toxic antigens of intestinal pathogens such as cholera or typhoid. This is an active and exciting area of current research.

We have already mentioned that genetically engineered vaccines will probably be inexpensive, except, of course, for the need to amortize research and development costs.

The chief disadvantages of genetically engineered vaccines do not apply to vaccines dependent on living, engineered microbes, but on pure antigen molecules. They are first the need to purify the antigen from all the other products made by the engineered organism, and secondly the question of antigenic strength, already discussed for synthetic vaccines, and likely to be somewhat less of a problem for whole protein molecules, but still not a negligible one.

While much of our discussion has focused on *E. coli* as a factory for pure protein antigens, or living harmless microbes as gene recipients, there are many variations on these themes. For example, yeasts are frequently mentioned as likely tools, not only because they can be grown so easily, but also because they are evolutionarily closer to vertebrates than *E. coli*, and thus have the capacity to add sugars to some genetically engineered antigens which are mixtures of amino acids and sugars. Generally, yeasts synthesize and process proteins in a form that more nearly approximates their natural form in the human host. For example, the hepatitis B vaccine currently being marketed by Merck and Co., USA, consists of particulate aggregates of a virus surface antigen termed HBsAg, which are present in the blood of chronic carriers of hepatitis B, and which have been collected and purified from blood donations. These aggregates come from the liver cells of the patient. When yeast cells are engineered with the gene for HBsAg, they produce particles very similar to those found in the serum of human carriers. These particulate entities have been very strong antigens in chimpanzees.

Animal cells are also being engineered successfully. While they are much more fastidious in their growth requirements, any description of the "state of the art" technology would be remiss in not pointing them out as possible factories of the future. However, the much greater cost of growing animal cells probably excludes them from practical vaccine manufacture for at least the next decade.

Vaccines in the pipeline: the challenges and the constraints

Given the above technological leaps, it is no wonder that academics all over the world are excited about all kinds of new vaccines or improvements in old ones. Dreams of great daring are being dreamed, extending the concept of vaccination from viruses and bacteria to single-celled or multicellular parasites, and even to non-infectious diseases like cancer and multiple sclerosis. A birth control vaccine is the subject of active research.[11] The sky seems to be the limit.

Yet, great though the need and the opportunity undoubtedly are, many academics underestimate the constraints which will ensure that new vaccines for human use will only materialize gradually. The first relates to funding. Vaccine research is expensive and risky, because research and development costs are high, but profits likely to be low, because directly or indirectly governments are the major users, and they are good at negotiating minimal prices. Moreover, drugs are used by patients daily for long periods, whereas once a person has been vaccinated, he or she only requires boosters at rare intervals, so the volume of sales is inherently lower than that of drugs. Overall, there is evidence that human vaccines are less profitable investments for the pharmaceutical industry than are drugs, and this would be even more the case for those vaccines required particularly for developing countries, with their lesser ability to pay.

The second constraint relates to the changing perceptions of regulatory agencies. Pasteur's rabies vaccine or even Jenner's smallpox vaccine would have great difficulties in today's regulatory climate, and indeed even the first tentative clinical trials would have trouble receiving approval by relevant ethics committees. Somehow, the balance has tipped too far towards requirements for safety—the risks of not deploying potentially effective agents rarely enter into the equation. Even if this issue is engaged for pure molecular vaccines, and is resolved, the difficulties with respect to suitable adjuvants and any living, genetically engineered organism as a carrier for antigens, will remain substantial.

The third constraint relates to expertise in the development component of research and development. Even though academics are buzzing with bright ideas about new vaccines, their capacity to translate a research breakthrough into a marketable product is notoriously limited, and partnerships with industry will be difficult to force in this traditionally low-profit arena. Will academics have the patience to see a vaccine through to the development phase, and to conduct the extensive clinical trials that will be needed? This is much less heady work than the original genetic engineering, but just as essential.

There are two distinct roles for a Consultative Group to Protect the World's Children relating to these dilemmas. First, from the very beginning of the project, a significant proportion of the funds raised for an expanded programme on immunization, say 10 to 20%, should be reserved for vaccine research. This will ensure that the bright ideas have some chance of being brought to fruition. Secondly, the group could influence world opinion concerning the design and implementation of clinical trials, allaying illusory or exaggerated fears, and speeding the movement from laboratory research to reasonable and responsible, but nevertheless forceful clinical research.

It is appropriate now to consider some of the examples of vaccines that appear to be within reach. There is no better place to begin than with a look at possible malaria vaccines.

Malaria vaccines: where are we now?

There are four major species of the single-celled parasite *Plasmodium* that cause clinical malaria in man, but the most serious is *Plasmodium falciparum*, which causes the highest mortality, particularly in children. Most of the current vaccine effort is being directed at *P. falciparum*, although if these efforts are crowned with success, the relevant principles will be applicable to other forms as well. Many decision makers in Western countries do not realize the enormous public health importance of malaria. Informed guesses put the number of cases at 200 million per year, and in some parts of the world, 50 of every 1,000 children die below the age of 5 from malaria. It is believed there are 1 million deaths annually in Africa south of the Sahara alone. Chronic and/or recurrent malaria poses severe health problems for older age groups. Despite the efficacy of some of the control programmes, there has been a resurgence of malaria over the last 20 years due to difficulty in maintaining effective control programmes indefinitely, development of resistance to insecticides among the mosquito vectors, and the emergence of drug-resistant strains. While it is hard to estimate the economic burden of malaria as such, it is known that not less than US$ 2,650 million was spent between 1955 and 1977 on attempts at malaria control.

A vaccine would be a wonderful and possibly decisive new tool in efforts to achieve global control. There are two basic and not mutually exclusive approaches that have made considerable progress over recent years. The first is to seek to vaccinate against that form of the parasite that first enters from the salivary gland of the mosquito after a sting from an infected one. This stage of the life cycle is referred to as the sporozoite.

The work of R. and V. Nussenzweig at New York University[12, 13] has given great hope that a suitable sporozoite vaccine will soon emerge. The sporozoite is covered by a highly antigenic surface protein called the circumsporozoite protein, or CS protein. Experimental animal studies of various analogues of human malaria have shown that monoclonal antibodies against the CS protein can protect against sporozoite challenge. The CS protein of the laboratory model has a distinctive and unusual structure, which includes 12 tandem repeats of a particular sequence of 12 amino acids, each repeat being separated by a stretch of highly variable amino acids. It seems likely that the repeat structure is the antigenically significant part of the molecule. Once genetic engineering technology finds the relevant structure of human rather than monkey or mouse malaria (and this can only be a matter of weeks or months), one could envisage the vaccine being developed either through the synthetic or the recombinant DNA approach.

Within minutes after the mosquito bite, the sporozoites enter the liver, and six to 12 days later, liver cells release the blood stage called a merozoite. It is the successive waves of invasion and destruction of red blood cells by merozoites that cause the classical fevers, chills and severe malaise of the disease. If even one sporozoite survives to elude the immune attack, a severe infection may follow, as the CS antigen is clearly quite different from the merozoite antigens.

For this reason, our malaria team at The Walter and Eliza Hall Institute has chosen to concentrate its efforts on a merozoite vaccine, the second major approach. While hoping for a "perfect" vaccine, we reasoned that even a merozoite vaccine that is less than 100% effective may produce great benefits. First, a drastic decrease in childhood mortality should result from a vaccine that decreases the severity and frequency of attacks. Secondly, a vaccine that is non-sterilizing but decreases the average level and duration of parasite presence in the bloodstream would lower the malaria transmission rate in a community, and thus the severity of the public health problem. Therefore, we planned a strategy based on recombinant DNA technology to fashion a merozoite vaccine.

No antigen analogous to the CS protein is known for merozoites. On the other hand, evidence exists that anti-merozoite immunity can be protective. It is therefore a question of patiently sorting out which antigens on the merozoite, and/or on the surface of the parasitized red blood cell, are the right ones to incorporate into a vaccine. We have been fortunate enough[14] to have been able to engineer the merozoite genes for potential antigens into *E. coli*, and to induce the bacteria to form large amounts of malarial antigens. Moreover, we have devised a strategy that should allow us to find the right ones for effective protection. Accordingly, we are in the process of forming a joint venture with the Queensland Institute of Medical Research, the Commonwealth Serum Laboratories, Melbourne, and a commercial firm, Biotechnology Australia Pty., Ltd, to pursue intensified research and development, in close association with the Papua New Guinea Institute of Medical Research. We are aware, of course, that a number of other research groups are pursuing similar goals.

If these efforts, ours or those of our "friendly competitors", progress to a stage where laboratory studies, including trials to protect monkeys against monkey-adapted human malaria, look sufficiently promising for a human vaccine trial, WHO will be responsible for the coordination and supervision of this work.

Obviously, much water needs to flow under the bridge yet, but it is a pleasure here to acknowledge the support we have received from the Government of Australia (National Health and Medical Research Council and National Biotechnology Programme), the Rockefeller Foundation Great Neglected Diseases Program, and the WHO/UNDP/World Bank Special Programme for Research and Training in Tropical Diseases.

In the happy event that both sporozoite and merozoite vaccines turn out to be effective, it would make sense to combine the two into a single, compound vaccine that attacks the problem from two different points. This would, of course, necessitate further developmental research and the Consultative Group might well find itself a sponsor of such work.

Hepatitis B vaccine: the first anti-cancer vaccine in history?

A small proportion of people, for reasons that are far from clear, become chronic carriers of the hepatitis B virus and have large amounts of the antigen HBsAg in their blood, as already mentioned. As many as 10^{13} particles (10 million million) can be present per millilitre of blood plasma. It is possible to bleed donors in such a manner as to remove the fluid (plasma) component of blood, but to return the white and red blood cells. Further, the HBsAg can then be purified from donated plasma and sterilized. In 1980, a clinical trial proved the capacity of this human-derived material to act as an effective vaccine capable of preventing hepatitis B infection. In 1982, two firms, Merck and Co., USA, and the *Institut Pasteur*, Paris, independently marketed rather similar vaccines. To date, there is every reason to believe that this vaccine is effective in its primary purpose, namely to prevent hepatitis B in groups at special risk, such as physicians, nurses, workers in blood banks, laboratory personnel, dentists, homosexuals, etc. However, an even greater challenge is looming on the horizon.

Primary cancer of the liver is uncommon in Europe or America, but is one of the commonest fatal cancers in Asia and Africa. Excellent evidence exists incriminating the hepatitis B virus as at least one of the causative agents of liver cancer. The relative risk of contracting liver cancer between chronic carriers and non-carriers is in fact higher than the relative risk of lung cancer in heavy cigarette smokers versus non-smokers, being 100:1, for example, amongst Chinese in Taiwan. A pathological sequence can readily be identified from viral destruction of liver tissue, attempts by the liver cell to divide rapidly to make up the damage, and finally frank cancer. It is evident from epidemiological studies that this progression takes several years. A final piece of incriminating evidence is that the genes of the hepatitis B virus integrate into the malignant liver cell. The evidence incriminating the virus, probably acting in association with genetic and/or environmental factors, in cancer causation has recently been summarized by the International Union against Cancer.[15]

Logically, then, it would be reasonable to suppose that preventing hepatitis B virus infection would prevent the eventual development of liver cancer. One problem is the fact that, in many cases, the carrier status develops in very early life, possibly through exposure to maternal blood and/or faeces during the birth process. Thus the vaccine will have to be given very early, or else babies will have to be protected by gamma globulin at birth and given vaccine somewhat later. Multicentre trials are currently underway to determine the feasibility of perinatal prevention of infection, and the first results of these trials will be available in 1984 at a major conference to be held in San Francisco, USA. Provided these trials succeed, the omens look good for a hepatitis B vaccine as a cancer prophylactic, though obviously it will be years till hard data are available.

Obviously, material from blood donors is not ideal as a source of antigen. It is expensive (about US$ 100 for the three doses recommended) and even though 2 million doses have already been distributed, the thought of vaccinating every child born into the world with human carrier-derived material strains credulity. Therefore, there are at least five or six initiatives under way for a genetically engineered vaccine. The Merck version is already undergoing clinical trials. This and related work will need to be carefully monitored by the Consultative Group. It could well turn out that a genetically engineered hepatitis B vaccine thrusts its way into our programmes reasonably soon.

Vaccines against diarrhoeal diseases

Overall, the diarrhoeal diseases are as important to world health as the parasitic diseases. Perhaps most publicity has been given to cholera, because of its frequently dramatic manifestations and its capacity to cause brisk epidemics, but other causative agents are of even greater public health importance. These include the Salmonella infections, typhoid and paratyphoid; Shigella infection (bacillary dysentery); infestation with amoeba (amoebic dysentery); and a wide variety of intestinal viruses. Diarrhoeal disease can interact with malnutrition and so an infection that might be readily controlled in industrialized countries may prove fatal in the sanitary and nutritional situations pertaining to some developing countries. Oral rehydration and antibiotics are very effective ways of combating many diarrhoeal diseases. However, as it will be many decades until environmental sanitation and personal hygiene practices in some tropical countries reach an adequate standard, the vaccine approach, with its capacity to prevent rather than cure, also has enormous potential in this field.

Yet, the vaccines against the major enteric diseases which are in widespread use, e.g., those against cholera and typhoid, leave much to be desired. The injectable killed typhoid vaccines are essentially the same as used 80 years ago. They cause adverse side reactions and the protection conferred is only about 50 to 70%. The injectable cholera vaccine is of low efficacy (50 to 70%) and its effects of short duration (six months or less). Fortunately, research, which includes both conventional genetic manipulation of microbes and more recent biotechnologies, is fast coming up with some alternatives.

On the typhoid front, an oral live attenuated vaccine, developed by R. Germanier of Switzerland, is showing great promise.[16] This vaccine, termed Ty21a, makes use of a stable double mutant of the typhoid bacillus which has lost the capacity to make some of the enzymes required for virulence. The safety and efficacy of this vaccine has been the subject of a three-year field trial in Egypt involving over 32,000 children. No harmful side-effects were noted, and even minor adverse reactions were scarcely above those of placebo controls. Over a three-year period, one case of typhoid fever occurred in 16,486 immunized children versus 22 in 15,902 placebo controls, and 39 in a further group of 25,628 unimmunized children. This 96% efficacy is most impressive, and a further trial is in progress in Santiago, Chile, where typhoid fever is highly endemic with incidence rates up to 140 per 100,000 per year. This trial, which began in May 1982, involves 85,000 children. If it, too, is positive, Ty21a will need to be looked at very closely by the Consultative Group.

As regards cholera, great efforts to produce a better vaccine by bio-engineering are under way. Finkelstein's group[17] have produced a live, attenuated cholera strain as an experimental vaccine which goes by the picturesque name of "Texas Star", and studies on normal human volunteers have shown it to be protective against subsequent challenge with live virulent cholera organisms. This strain lacks the gene for one part of the cholera toxin and thus does not cause disease. Its only drawback is that it caused mild to moderate transient diarrhoea in 24% of the volunteers, which puts mass population administration in some doubt. Another strand of research seeks to clone *V. cholerae* antigens into other gut bacteria, creating a live vaccine through recombinant DNA technology. A further approach is to produce cholera antigens, which form part of the lethal toxin but are themselves non-toxic, and to give these orally as a molecular vaccine to supplement standard killed whole *V. cholerae* vaccine. A fourth approach uses large, non-toxic aggregates of heated cholera toxin with the provisional name "procholeragenoid".

It will take some years to sort out the best of these lines of research, but the long-term future looks bright for a cholera vaccine that really works.

Shigellosis or bacillary dysentery has not hit the headlines to the same extent as cholera or typhoid, yet it is the cause of much diarrhoea, ranging from mild to severe and fatal, in many parts of the world. Shigella bacteria possess highly toxic antigens in their cell walls, and also secrete a potent protein toxin into their environments. The combination can cause extensive cell damage within the intestine and even death. Experimental dysentery vaccines are on the horizon. One intriguing oral vaccine is based on genetic engineering. The antigens of Shigella are introduced into the Ty21a typhoid Salmonella, and one has two for the price of one, a combined Shigella-typhoid vaccine![18] This concept works in mice; it has yet to be tested in monkeys and humans.

Of the viral vaccines in the research pipeline, the one that is nearest to fruition is a rotavirus vaccine, giving protection against a common, but not exceedingly severe, form of viral diarrhoea in children.

Measles: the next candidate for global eradication?

The layman has an incorrect view of measles as an irritating but harmless disease of childhood that everyone gets, but gets over. In fact, measles is a serious disease. In Western communities, complications include encephalitis, pancreatitis and secondary bacterial problems such as middle ear infections. These severe complications do not occur at a high incidence per case, but help to fill wards in children's hospitals because of the great prevalence of the disease. In some Third World epidemics, particularly in isolated regions where the disease is not endemic, the primary measles infection has proven devastatingly toxic, causing many deaths. For this reason, a live, attenuated, injectable measles vaccine has been included as one of the six vaccines to be deployed in EPI.

Recently, measles vaccination has been given a novel twist by Albert Sabin, the developer of the Sabin oral poliomyelitis vaccine.[19] One of the problems with the conventional injectable vaccine is that it does not "take" in very young infants, because it is neutralized by anti-measles antibodies that have crossed from the mother's bloodstream through the placenta to the fetal bloodstream. These antibodies decay only slowly, providing the young infant with protection against measles up to about the age of 6 months. There is a potential problem for infants in the second half of their first year of life, where maternal antibodies may be inadequate for protection but sufficient to interfere with vaccine take. Sabin and collaborators decided to administer an undiluted, conventional live attenuated measles vaccine not by injection but by inhalation as an aerosol. Special attention was paid to children aged 4 to 6 months, who usually have enough maternal antibodies to prevent a good immune response against injected vaccine. In this age group, 90% of 39 infants responded to the aerosol with good antibody formation by 6 weeks, and all did so when tested at 6 months of age. The same 100% "take" was demonstrated amongst older infants and children. Side reactions were mild and infrequent.

The apparent success of this approach obviously requires independent confirmation and extension. However, as there is no animal reservoir of the measles virus, it is not altogether wild to think of the possibility of eventual global eradication. This is a long way off, but the existence of a thrusting programme such as is envisaged by the Consultative Group brings the goal potentially closer.

Lists, if exhaustive, are also exhausting, and so I will refrain from summarizing exciting work in other areas. Suffice it to say that the above analysis is only exemplary. Vaccine research is alive and well for bacterial infections such as tuberculosis and leprosy, sexually-transmitted diseases such as syphilis, gonorrhoea and herpes, virus diseases like dengue fever, influenza and hepatitis A, as well as for a variety of special situations more relevant to developed countries, such as vaccines against gramme-negative bacteria that cause infection in surgical wounds, etc. The more the power to manipulate microbes and antigens grows due to the continuing biotechnology revolution, the faster these efforts will come to fruition.

A blueprint for future action

"Health for all by the year 2000" will not be achieved by the six present childhood vaccines alone. They represent a solid beginning for a global immunization programme, but a flexible attitude to the inclusion of new vaccines will be necessary. There must be heavy input from member countries, because problems of communicable diseases present tremendous geographical variation. There must not only be a passive monitoring of global vaccine research (important though this will be) but an active commitment to it. It has been my privilege to witness at close quarters what two relatively modest (in financial terms) initiatives have done for research into parasite vaccines. I refer to the WHO/UNDP/World Bank Special Programme for Research and Training in Tropical Diseases, and the Rockefeller Foundation Great Neglected Diseases Program. Because of superb planning, selection of the most worthwhile lines of endeavour and the most able scientists, and a conscious effort to engage the minds and spirits of world leaders of research as active supporters of the initiatives, a catalytic avalanche has started, which is essentially unstoppable. The initial funding has been multiplied many times over as pressure on national and international funding agencies to join the fray has mounted. If a global immunization programme got behind vaccine research in the same intelligent and selective way, but with more substantial funding, an equal multiplier effect would ensue. The conscience of the world is ready to be stirred by this cause. Many of the new vaccines have been waiting in the wings for too long, being largely the dreams of selected, small groups of scientists with limited financial and moral backing. The climate is changing; what is needed is a crystal in the supersaturated solution. We finish where we began—vaccines are the most cost-effective public health tool in history. It is time the world began to behave as if it knew this to be so.

Acknowledgements

The author's own research is supported by the National Health and Medical Research Council, Canberra, Australia, and by Grant no. AI-03958 from the National Institute for Allergy and Infectious Diseases, United States Public Health Service. The many sources of support for the immunoparasitology research of the Hall Institute are listed on page 117 of its 1982-1983 Annual Review.

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Guidelines for action

- A Joint WHO/UNICEF Statement
- Potential role of Red Cross
- PolioPlus Programme
- Channelling strategy

New policies

Planning principles for accelerated immunization activities

A Joint WHO/UNICEF Statement

These guidelines are intended to highlight some broad principles concerning programme acceleration. Since policies in the field of immunization are evolving so rapidly the intention is that they will be updated and revised as necessary. The guidelines are a supplement to, but not a substitute for, the training materials prepared by the Expanded Programme on Immunization (EPI), World Health Organization, Geneva, which provide a more comprehensive guide to immunization programme management.

Introduction

1990 is rapidly approaching and global immunization coverage, though currently rising, remains unacceptably low. Although more than half of the children in the developing world (excluding China) are estimated to receive a first dose of poliomyelitis and DPT vaccines, only a little over one-third receive a third dose. Raising coverage levels for these and other vaccines to the point where significant reductions in morbidity and mortality can be sustained remains a formidable challenge. Yet this challenge can certainly be met. What is now required is an intensive mobilization of political will, application of new

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This Joint Statement, issued by WHO in 1985, is available upon request from WHO and UNICEF in the form of a booklet under the same title.

Assignment Children, vol. no. 69/72, 1985

techniques of communication and social mobilization, and sustained application of the management support required to transform that mobilization into effective programmes.

The determination of UNICEF and WHO to achieve the 1990 goal of making immunization available to all children has been underscored in the past year by several examples of countries beginning accelerated action; many additional countries have similar plans for the next two years, and the 1985-1986 40th anniversary of the United Nations will include endorsement of the 1990 immunization goal as a "banner" marking United Nations aspirations and effectiveness.

In practice, political will, as reflected by the attitudes of heads of state, has not been difficult to mobilize. Few leaders remain unenthusiastic when given the promise that their nation's children can be protected quickly and inexpensively through immunization. If this is done through the broad mobilization of the country's resources in one or a series of national immunization days, an added attraction is the potential for positive political feedback. This "political will" has shown itself to be a powerful force for the attainment of rapidly increased immunization coverage in individual countries. During the next year, UNICEF and WHO will work to expand these individual examples into a "world goal" and enlist all heads of state in the effort.

Providing management support remains a high priority objective and a frequently difficult problem. National and international staff alike should recognize the problems, as well as the opportunities, presented by accelerated or intensified immunization activities. Not only must the initial efforts be successful, they must lead to sustained improvement in immunization services.

The priority for immunization programmes in developing countries is to reach children as early in life as possible, and to attain as high a coverage as possible. The EPI target diseases strike early. Perhaps half of the deaths caused by pertussis occur in the first 6 months of life. Waning maternal antibodies make poliomyelitis and measles increasingly important diseases between the age of 6 and 12 months.

Unfortunately, because of interference from maternal antibodies, measles immunization should be deferred to 9 months, but oral poliomyelitis vaccine can be administered from birth (inactivated poliomyelitis vaccine can be begun at around 3 months of age), and DPT can be begun at 6 weeks of age. For DPT and poliomyelitis vaccines, which require more than one dose, spacing doses as closely as possible provides early protection and helps reduce drop-out rates. A minimum interval of four weeks is needed between doses of DPT and oral poliomyelitis vaccine and the schedule for inactivated vaccine is still under study.

Unless the immunization system can assure that children, as they are born, are continuously covered, the initial impact which can be achieved by a successful mass immunization effort will be quickly eroded. Programmes aimed at too broad an age group risk "chasing their own tails", as it is often the case that the youngest age groups are systematically missed. Benefits for older groups of children are sharply reduced, as many will have already had one of the diseases in question. Reaching the youngest children requires specific identification and active follow-up of children born into a community. If this is emphasized from the beginning and if high coverage can be achieved then the problem of older aged susceptibles quickly disappears.

Planning for acceleration

The key word is planning. Once launched, or once high-level political commitment has been obtained, accelerated activities take on a life and a pace of their own, with the risk that at times they may outrun the best intentions and efforts of the technical staff involved. Planning for a *single* effort, such as a national immunization day or a series of days, is not enough. From the beginning, plans must be made with a perspective of at least three years. Launching a national or local immunization day now, hoping that the future will take care of itself, is not the act of a responsible manager. This is not to say that risks should not be taken, or that all details must be worked out and all problems solved in advance. But immunization days or other mass activities *alone* will rarely lead by themselves to sustainable programmes. Building such sustainability becomes much more difficult if done as an afterthought than if done as an integral part of plans from the very beginning.

Sometimes the manager is faced with a *fait accompli*: a commitment to acceleration has been made and rapid action is needed to produce results. Options in this case may be quite limited, and one may simply have to make the best of the situation. Whenever possible, however, the national and international staff involved should jointly undertake a one to three week technical review of programme needs and opportunities and provide at least a skeleton plan for acceleration and follow-up programme expansion. If appropriate, WHO and UNICEF can provide outside consultant assistance. Accelerated programming may or may not involve the use of special immunization days. If such a joint planning review can be performed before the political leaders have committed themselves to a detailed strategy, so much the better.

Not only should planning take into account the long-term perspective, it should adequately reflect the realities of lead-times required in the short term. Planning for the improvement of routine immunization services is more permissive than planning for one or more national immunization days. While shortages of supplies and staff provide setbacks to routine services, they can prove catastrophic to an immunization day, particularly if community mobilization has been effective and demand for immunization is widespread.

The identification of all individuals who will be involved in the programme must be done well in advance, and they must be provided with practical training concerning exactly what they are expected to do. Again, routine services are more permissive in this respect than are national days. When the actual day or days come, peripheral staff require supervision and support so that errors or unforeseen problems can be quickly identified and corrected. This implies the need not only for adequate supervisory staff, but also for excellent communications. Information on problems must quickly reach those in a position to provide solutions, and those solutions, whether in the form of information or supplies, must quickly reach those who have requested the help.

The public, or consumer, side of the programme requires meticulous planning and ample lead-time. Effective social mobilization is a far cry from simply assigning an advance person to circulate in the neighbourhood with a loudspeaker to announce an immunization session. Information needs and messages must be analyzed for each of the groups whose support is needed to assure the participation of mothers and children in the programme. For each message and for each group, the most effective way of presenting that message must be decided upon, and the particular medium for providing that message must be found. The messages and the means and materials to reach the target audiences must be compatible with long-term programmes as well as with short-term intensified programmes. This job requires expert knowledge of the national communication networks and possibilities. Thorough utilization of multisectoral channels for both communication and programme implementation requires not only the involvement of a broad range of government ministries, but also the involvement of civic, cultural, religious, and other community-based national and local organizations.

It is a tribute to the generally high standards of the current vaccine procurement and delivery systems operating worldwide, that vaccine needs are given minor consideration with respect to accelerated programmes. But miracles cannot always be performed. There is the recent experience of a commitment for a large quantity of vaccine being made for a certain date. In the event, the commitment was met. But it was met by taking vaccines which had been programmed well in advance for several other countries and diverting them to this one country. Routine immunization services had to be delayed in these other countries, causing understandable distress and disruption. The initial commitment should not have been made without a lead-time of at least four months and preferably longer. Before deciding to use a strategy of an immunization day and before setting a target date for that day, programme managers and vaccine supply sources must confirm that adequate supplies of vaccines can be provided on time. Adequate development of training and logistic components of the programme require even longer than the four-month minimum for assured vaccine delivery.

Plans should be made from the beginning to provide health staff and community workers with feedback on their performance, emphasizing the good things that they have done and assuring that they know what coverage results they have achieved. In the case of poor performance, planning should provide for positive corrective procedures including training.

A final caution on planning: consider the costs of the acceleration and where financing will come from. Funds can often be mobilized from a variety of voluntary sources for the short term, but are rarely so freely available over a period of several years. Plans for sustained programmes must be made within the context of a realistic expectation of what can be provided by the government itself and what can be provided by outside collaborators. The long-term resource objective in immunization programmes is national fiscal and technical self-sufficiency, and short-term efforts should be conducted with this in mind. Creative short-term efforts can aid in mobilizing political and community support for long-term programmes.

There are many ways in which programmes can be accelerated, and they are often complementary. All programmes can profitably review what can be done to improve existing services, and this is discussed first. In certain programmes, the approach of a national immunization day or a similar mass campaign strategy may be called for, and this is discussed in a succeeding section.

Acceleration by improvement of the existing primary health care services

The long-term goal of acceleration efforts is to strengthen the health infrastructure so as to assure the continuous provision of immunization and other primary health care services. But in the short term as well, strengthening of the existing delivery and information systems can provide a basis for rapidly increasing coverage. More than half of the infants in the developing world are already receiving a first dose of one of the EPI vaccines. Better performance of existing services will rapidly increase coverage with measles and a third dose of DPT and poliomyelitis vaccines. And many simple things still remain to be done.

Part of the efforts to improve existing services need to be directed to reinforcing the services themselves, assuring that staff are adequately trained, are supervised and are given adequate logistic support. Clinics too often impose long waiting times and staff too often do not effectively inform mothers of when they should return for additional immunizations for their children. Not all existing health facilities are providing immunization, and many immunization/MCH clinics still needlessly refuse to immunize children with minor illness or malnutrition. Outreach and mobile clinics are often too few, but even those that are provided are often irregular and inconvenient in time and place. All health facilities and clinics need to be clean and inviting, conveying the image of health rather than disease.

Part of the effort, however, needs to be directed toward mobilizing community resources. Their potential is enormous and their involvement is indispensable in countries where the health infrastructure remains weak. The community should have a major role in establishing the time and place of immunization clinics. Community helpers can identify the children who require immunization and "channel" them to the health services. In Colombia, the "channelling" has been done by a respected individual from the community and a health worker visiting homes together, identifying children, registering them for the programme and providing health education and motivation. In Madras, India, either a community member or a health worker performed such visits. Both approaches have been highly successful.

Schools also represent a much neglected resource. Health education efforts directed toward schoolchildren in Abidjan, Ivory Coast, and Bombay, India, to cite but two examples, have been effective in increasing immunization coverage, as the schoolchildren have motivated their parents to assure that younger children in the household are fully immunized. Efforts of the community on behalf of immunization should be encouraged to develop into permanent support for primary health care as a whole.

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Four specific areas of action may be suggested for increasing immunization coverage by accelerating and strengthening existing services. These activities can help improve the performance of the health services and can also help in mobilizing community resources.

1. Provide immunization or information about immunization at every health contact

Immunization should be offered by all curative and preventive health services. In both, immunization should be offered even to children suffering from malnutrition or minor illness.

2. Reduce drop-out rates between first and last immunizations

a) Strengthen the participation of communities in immunization programmes, including the involvement of the private and voluntary sectors.

b) Provide immunization services at more convenient times and places and increase the use of regularly scheduled outreach clinics.

c) Better inform parents of the need to return and of the times and places to return.

d) Better identify children who are eligible for immunization and actively seek out those who are missed.

3. Increase the priority being accorded to the control of measles, polio and neonatal tetanus

Measles is the number one killer among the EPI target diseases. In some areas, however, coverage with measles vaccine is lower than with DPT or poliomyelitis. Increased emphasis on immunizing children against measles will not only help increase measles coverage rates, but will help raise coverage for DPT and poliomyelitis, particularly for second or third doses, as these can be given with measles.

The crippling effects of poliomyelitis are known and feared in communities where this disease persists. Global reductions in the reported incidence of poliomyelitis are already being recorded as a result of EPI and dramatic further reductions can be anticipated in coming years as immunization coverage improves.

Very little progress has yet been achieved in the control of neonatal tetanus which remains a "neglected disease" despite accounting for almost a million deaths a year. Cases can be prevented both by assuring clean delivery and postnatal care practices and by maternal immunization. Each case testifies to multiple failures in maternal and child health care. This disease has virtually disappeared from industrialized countries and should no longer be tolerated anywhere in the world.

4. Improve immunization services to the disadvantaged in urban areas

Half the population of the world is expected to reside in a limited number of large urban areas in the year 2000. Despite the relative abundance of health facilities and health personnel in urban as compared with rural areas, immunization coverage rates in the slum areas surrounding major cities are typically poor. High migration rates, lack of social cohesion and friction between new immigrants and established authorities pose barriers which have proved difficult to overcome. But accessible services *can* be provided in such circumstances without too many financial or logistic problems. Increased priority should be given to accomplish this in the short term while continuing efforts to provide more equitable services to rural areas.

Acceleration by national immunization days

Particularly where political commitment to an immunization effort is high, there may be strong incentives for recommending that a mass mobilization effort be undertaken during which volunteer workers, backed by intensive publicity, supplement the routine health services in order to provide immunization to children who live in a city, a district, or an entire country. Such efforts may last a single day, be a series of single days, or may continue for several days or weeks.

Some efforts such as these have been spectacularly successful. They have led to rapid improvement of immunization coverage in the short run and their success has catalyzed a willingness to undertake initiatives with respect to other areas of primary health care. As noted above, success requires meticulous planning and organization in the areas of logistics, staffing and publicity. Such planning must assure that vaccine is available when and where needed, that the volunteers are adequately trained for the variety of tasks which must be performed, and that the public is well informed about the programme and motivated to participate. The personal involvement of political leaders at the highest level has also been an important ingredient.

But national days, even if well executed, have risks as well as benefits which need to be appreciated. The fundamental issue is *sustainability*. Few societies have the capacity to exhort full participation in national days for more than a few years. Where infrastructure and managerial skills are weak, efforts may falter earlier, and even initial efforts if not properly planned and executed may exact an exorbitant cost in terms of other health activities suspended in order to carry out these immunization activities. Negligible benefits in reducing morbidity and mortality may result, because of systematic failure to immunize infants under 1 year of age, who tend not to be brought forward in mass efforts unless specific active search for them is employed. Instead, it is the older children, who are able to walk on their own and who are already beyond the age of highest risk from the target diseases, who receive most of the vaccines.

The support and personal identification of national political leaders with national days should be sought. But this support should be translated into a *national* political objective, transcending individuals and parties to remain secure in the face of political change. Campaigns need the involvement of those outside of the health sector. But those within the health sector also need to be fully committed, as they will remain the long-term providers of immunization services. Parents need to be motivated to participate. But they should also be motivated to seek routine immunization services rather than simply waiting for the next campaign.

A spectacular immunization effort, if not well followed through, can produce an equally spectacular epidemic. High immunization levels achieved only briefly, temporarily suppress the transmission of disease. Newborns can then accumulate as susceptible children until disease transmission again becomes easy. It is at this point that an epidemic may explode. Understandably, health authorities may respond with another mass programme, but this one more hastily organized, and often too late. Nevertheless, the epidemic ends. Credit, whether or not justified, goes to the campaign. This cycle may be repeated: waves of disease followed by waves of immunization.

For national immunization day strategies, careful thought is required concerning the age groups to be included and concerning the documentation required. If vaccines against all the EPI diseases are included (to be strongly encouraged), careful record-keeping and immunization according to previous immunization history are mandatory to assure that neither too few nor too many doses are administered. A general upper age limit may be applied for all vaccines (generally 2 years, but even older if the epidemiological situation warrants it). As a general rule, children younger than 6 weeks should not receive DPT, and children younger than 9 months should not receive measles vaccine.

During the second year or cycle of the immunization days, the number of eligible children will decline, approximating the number of children born since the start of the previous year or cycle, plus those remaining below the age ceiling who were missed previously. If the initial cycle has been successful, the number of eligibles will decline sharply. For the subsequent annual cycles to remain effective, a channelling strategy which actively seeks out susceptible children is likely to be needed.

The role of volunteers needs to be carefully defined. While it may be easy to train them to properly administer oral poliomyelitis vaccine, the injectable vaccines pose considerably more of a challenge, and unacceptable rates of vaccine wastage and abscesses may occur. Untrained volunteers are perhaps best used to help in registering the target population prior to the programme and to help in assuring that those registered come for immunization when the services are offered. The completion of registration some two months before the campaign will help the organizers finalize decisions concerning logistics and immunization sites, dates and times. In settings where remote or dispersed populations make advance registration unfeasible, detailed current population estimates are important for sound programme planning.

Where only oral polio vaccine has been provided, some programmes have offered immunization to all children below the upper age limit regardless of their immunization history, and have not provided individual immunization records. This has the advantage of logistic simplicity; however, lack of immunization records complicates the task of evaluation.

In countries where neonatal tetanus remains a problem, consideration should be given to providing women of childbearing age with tetanus toxoid during the immunization day in addition to the immunizations for children. In such countries, this measure should be an important public health priority. It could help to eliminate neonatal tetanus which currently causes some 1 million deaths per year. An immunization record for women is advised under these circumstances, as hyper-immunization with tetanus toxoid can provoke adverse reactions.

National immunization days should be considered as a catalyzing and energizing tactic. They can be extremely useful in many circumstances to further the long-term strategy of providing immunization in consonance with other health services, particularly those directed toward mothers and children. When employed, their contribution to the long-term strategy needs to be carefully defined, and actions taken in support of such days should also be designed to reinforce the functioning of the existing health services.

Social mobilization, the keystone of programme acceleration

Whatever operational strategy is adopted for the acceleration of a national EPI programme, it has become clear that mobilization of both effective consumer demand and multisectoral resources to provide immunization are the key elements in achieving a rapid and sustainable increase in immunization coverage. All the many informational and promotional techniques available should be employed to motivate mothers to bring their children to be immunized, especially those with infants under 1 year of age, who are often the hardest to reach and yet the most important group. Stimulating the commitment and energy of health professionals and community workers is crucial to assuring not only expanded coverage, but also high quality service delivery.

Social mobilization is equally applicable to mass campaigns, national immunization days, intensified expansion of primary health care infrastructure, and to the various *combinations* of these approaches which are necessary for sustained high immunization levels. Such mobilization may include the involvement of national political leaders and celebrities, the mass media and less formal communication channels, community action by public and private sector organizations, and the more traditional health education techniques.

Rather than being seen as competing alternatives, these various programme approaches, within a broad strategy of social mobilization, should be seen as complementary and even synergistic. A well carried out mass campaign, or a series of successful and confidence-building national immunization days (or weeks) can be a stepping stone to not only sustained immunization services, but also (as has been recently demonstrated in a number of countries) the development of a broader set of activities to improve child survival and primary health care.

Evaluation of acceleration activities

Evaluation is an important component of immunization programmes and should be given special emphasis in the early planning and implementation stages of any accelerated immunization strategy. Because there is often "too much to do" in getting ready, evaluation may be relegated to the status of an afterthought. But objective data are required to assess the results of the strategy, particularly as the publicity and enthusiasm surrounding an event such as a national day make subjective judgements unreliable. Real strengths need to be recognized and reinforced: real weaknesses need to be recognized and eliminated.

Data priorities include estimations of the immunization coverage obtained among children in their first year of life (perhaps obtained through the use of the EPI cluster sampling technique) and, subsequently, estimates of the impact of the accelerated strategy on disease reduction (perhaps obtained through review of incidence trends in selected facilities whose diagnosis and reporting capabilities are thought to be reliable). Data concerning poliomyelitis, measles and neonatal tetanus should receive first priority as they are clinically distinctive and true incidence can be expected to decline rapidly in the face of effective immunization.

Less formal data will also be of use in planning for improved performance on future occasions and for providing guidance to managers in other countries who are trying similar approaches.

A series of questions can be addressed to those involved with the planning and the actual implementation of the acceleration strategy:

- What worked best? What were the major shortcomings and deficiencies?
- What problems were encountered, how were they identified and how were they overcome?
- In the light of present knowledge and experience, what should be done differently next time?
- How were the human, institutional, material and financial resources mobilized and how were they managed?
- How was the communications component of the programme planned and implemented?
- What were the total costs of the effort, and the costs of the various components?
- What has been the relationship of the accelerated programme to the expanded development of ongoing immunization services?
- What has been the effect of the mass campaign on other ongoing health activities?
- How could the international collaborators (particularly WHO and UNICEF) improve their support for such efforts?

Conclusion

Sound programme planning and reinforcement of the existing primary health care infrastructure are the bases for the long-term success of immunization programmes. They are also essential for the acceleration of programmes that is now required to meet the 1990 goal. Acceleration efforts should include improving the quality of existing services by providing better training and supervision of health workers, and by assuring that communities are intimately involved in the planning and delivery of those services. The use of national immunization days as a supplement to routine services has been introduced with success by a number of countries. But this approach must be planned and implemented in ways which assure the long-term sustainability of immunization services. It should be considered as *one* way, not the *only* way to accelerate programmes. Evaluation is an important part of all immunization activities and should be a priority component of accelerated activities, including national immunization days, so that national authorities can quickly obtain an objective picture of what is working and what is not working, and modify their strategies accordingly.

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The following elements should be considered as desirable features of accelerated immunization efforts:

- use of all antigens included in the routine national immunization schedule for infants;
- use of a time framework for any acceleration strategy to permit delivery of three DPT/poliomyelitis immunizations, i.e., a minimum of three immunization days or weeks with an interval of four weeks between immunizations;
- use or introduction of records and a recording system that may be utilized by the *routine* health services;
- ordering of cold chain equipment, supplies and transport which conform to the materials already in routine use within the health services;
- organization of a volunteer structure that is coordinated with the permanent health staff and health facilities;

- utilization of a broadly-based multisectoral approach, especially for communications and motivation, but without bypassing or alienating the regular ongoing health system;
- information and media publicity that create public awareness of the permanent delivery system as well as of any special strategy such as national days, and that induce motivation to achieve fully immunized status after the accelerated effort is concluded;
- utilization of a system for vaccine distribution that is capable of being replicated on a smaller scale by the permanent logistics networks;
- evaluation of the coverage achieved which permits a distinction to be made between children below the age of 12 months and older children;
- evaluation of the impact of the programme in reducing the incidence of the target diseases, with particular emphasis on poliomyelitis, measles and neonatal tetanus;
- evaluation plans, and responsibility for carrying them out, which have been specified *prior* to the start of the programme.

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Acceleration activities should be encouraged and planned so as to contribute to the strengthening of the health infrastructure.

EPI training materials are generally available at national levels either in the form of the original WHO prototype materials or in their national adaptations under the titles of "EPI training for mid-level managers", "Immunization in practice: a guide for health workers who give vaccines", and "Cold chain and logistics for primary health care". If they are not available locally, they can be obtained from WHO Regional Offices or from WHO Headquarters in Geneva. A concise summary "Information for action issue paper: immunization" was prepared for UNICEF by the World Federation of Public Health Associations in May 1984, and is available from UNICEF.

League of Red Cross and Red Crescent Societies

International Federation of National Red Cross and Red Crescent Societies

Resolution
passed on 24 October 1985

The General Assembly,

being aware that the vaccine-preventable diseases (tetanus, diphtheria, whooping cough, poliomyelitis, measles and tuberculosis) are a major cause of childhood disability and death in developing countries;

knowing that these diseases additionally increase the occurrence and severity of a number of other health problems which have a serious impact on both mortality and the quality of life of children in developing countries (for example malnutrition and diarrhoeal diseases);

understanding that despite the availability of safe and effective vaccines only a relatively small percentage of children have been fully immunized in many countries;

appreciating that for the control of vaccine-preventable diseases, immunization programmes will need to be linked to other primary health care activities, and that preventive interventions will need to be developed alongside curative and rehabilitative services and general development activities;

recognizing the unique position of National Red Cross and Red Crescent Societies to play a role in strengthening the provision and utilization of national immunization programmes;

appreciating that an involvement with national immunization programmes would add substance to previous resolutions in support of primary health care, would complement recent initiatives directed towards nutrition and diarrhoeal diseases (Child Alive) and would strengthen the emergency and relief responses of National Societies;

being aware that the ultimate responsibility for the control of vaccine-preventable diseases lies with national governments, and that National Red Cross and Red Crescent Societies must work within the policies and plans of their national Ministries of Health by helping to strengthen, support and expand existing national immunization programmes;

mindful that any developments of National Societies relating to the control of vaccine-preventable diseases will need to be both complementary to national immunization programmes and also coordinated with the Expanded Programme on Immunization of the World Health Organization, UNICEF and the activities of other organizations involved with national immunization programmes;

accepting that any involvement with immunization programmes requires a long-term commitment on the part of National Societies, both in terms of enthusiasm and resources;

cognizant of the fact that the potential involvement of National Societies with the control of vaccine-preventable diseases will be diverse and will vary with their resources, available expertise and current activities;

i. **invites** National Societies to determine ways in which they could become more actively involved in the control of vaccine-preventable diseases through their participation in national immunization programmes, based on their existing resources and current activities;

ii. **requests** the Secretary-General of the League, in consultation with the representatives of National Societies and specialists in the field of immunization, to identify ways of stimulating and supporting the activities of National Societies for the control of vaccine-preventable diseases, and to ensure that such activities are coordinated with those of WHO, UNICEF and other organizations involved with the control of vaccine-preventable diseases.

Guide to action

The potential role of Red Cross and Red Crescent Societies in national immunization programmes

New opportunities for strengthening the Child Alive Programme

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The League of Red Cross and Red Crescent Societies launched the Child Alive Programme in 1983 as part of its commitment to primary health care (PHC). The aim was to give greater impetus to the initiatives of National Societies which were directed towards reducing childhood morbidity and mortality. In the beginning, the programme focused on diarrhoeal diseases and their associated malnutrition. It soon became apparent, however, that another major challenge was closely linked to these health problems: the control of the vaccine-preventable diseases.

In October 1985, the General Assembly of the League of Red Cross and Red Crescent Societies therefore adopted a resolution urging National Societies to become more involved with national immunization programmes. Stimulating and supporting such involvement is now an integral part of the work of the Child Alive Programme.

The paper below is based on a discussion document which the Child Alive Programme is sending to all Red Cross

Assignment Children, vol. no.69/72, 1985

and Red Crescent Societies. The purpose of this document is two-fold. First, to motivate and encourage National Societies to participate in national immunization programmes by providing them with information about the importance of the vaccine-preventable diseases (much of which has been excluded from this extract) and by outlining the rationale and opportunities for such participation. Secondly, to provide National Societies with indications for action and a methodology for approaching some of the decisions which would need to be taken prior to any involvement with national immunization programmes.*

Although prepared specifically for Red Cross and Red Crescent Societies, these guidelines for action raise a number of issues which are likely to be of relevance to other non-governmental organizations (NGOs).

Introduction

Measles, diphtheria, pertussis, tetanus, poliomyelitis and tuberculosis are major causes of disability and death among children in most developing countries. In order to decrease the morbidity and mortality associated with these diseases it will be necessary to ensure that virtually all infants have been fully immunized. However, although major advances have been made in the control of these diseases during the past few years, and a number of obstacles have been overcome which had previously been considered to be almost insurmountable, there remains much to be accomplished: in terms of coverage, less than 40% of the target population has been immunized in many developing countries. The main causes of these low coverage rates continue to be inadequate provision and poor utilization of immunization services.

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* The League of Red Cross and Red Crescent Societies, *Red Cross and Red Crescent Societies, the control of vaccine-preventable diseases and collaboration with national immunization programmes—guidelines for action*, Geneva, 1985, 29 p.

Important technological developments have recently taken place which have ensured that the vaccines are safe, simple to administer, relatively cheap and, with very few serious side-effects, generally provide long-lasting protection against these diseases, even under the difficult conditions encountered by health workers in developing countries.

Of perhaps greater importance, however, are the breakthroughs which have taken place with increasing national and international political commitment to immunization programmes: improving awareness about the extent of the problem of the vaccine-preventable diseases; generating and maintaining the involvement of governments and international and national organizations in implementing and evaluating immunization programmes; supporting infrastructural developments of health and related services, with particular reference to rural and deprived urban communities; developing effective techniques for social mobilization, and experimenting with new and imaginative approaches to providing immunization services.

In addition, increasing attention has been paid to factors which have been shown to have negatively affected the utilization of immunization services, and opportunities for solving a number of them have been identified and successfully implemented. This has involved ensuring that the communities concerned understand which diseases can be prevented by immunization, appreciate why immunization is important, know the target groups for immunization and the side-effects of the vaccines, and want to be vaccinated. It has also focused on ensuring that the services have been sufficiently actively promoted for people to know who, when, where, and how often they should attend for immunization.

Clearly, developments relating to provision and utilization must progress hand-in-hand. There is little point in generating a demand for immunization if the services are unable to meet these expectations. Similarly, it is futile to expand the provision of vaccines if people do not know enough about either the diseases or the services to actually take advantage of what is provided. Thus a fundamental aspect of the development of immunization programmes is concerned with ensuring that the health services know what the people want and need and that the people know what the health services have or could be expected to offer.

The Child Alive Programme and immunization

During 1983, a major new initiative was taken by the League of Red Cross and Red Crescent Societies. Known as the Child Alive Programme, its aim was to strengthen national PHC programmes by stimulating and supporting the involvement of National Societies in activities directed towards decreasing childhood morbidity and mortality, through the control of diarrhoeal diseases and their associated nutritional problems. The intention was not to view these activities as an end in themselves, but to help with the development of the expertise and orientation which are essential for the provision of all aspects of PHC, whilst at the same time attending to a few selected health issues which are priorities for most communities in developing countries.

The 1985 General Assembly of the League of Red Cross and Red Crescent Societies adopted a resolution (see pp. 155-156) which has opened the way to incorporating immunization into the Child Alive Programme. This is not to suggest that a number of Red Cross and Red Crescent Societies have not already been extensively involved with or committed to their national immunization programmes. However, for those National Societies which are not currently participating in national immunization programmes and for those societies which wish to expand or consolidate their involvement, it is a logical progression from previous resolutions of the General Assembly and from their current relief and development activities. Not only are the vaccine-preventable diseases major causes of childhood morbidity and mortality, but they are also closely interrelated, both in terms of cause and effect, with malnutrition and diarrhoeal diseases. Furthermore, within the context of the overall provision of PHC, the development of the skills necessary to support immunization activities are complementary to those which are the current focus of the Child Alive Programme.

Involvement with national immunization programmes: why Red Cross and Red Crescent Societies?

Do National Societies have anything special to offer in the development and expansion of national immunization programmes? The answer is a resounding "yes", for the reasons mentioned below.

- Historically they have demonstrated a willingness and an ability to respond to need and, as a result, they are recognized and respected by the people with whom they work.
- They have experience in working and collaborating with their national governments and have also often developed expertise in technical issues, for example blood supplies and vaccine provision during relief work.
- Usually they are already working in the health sector and have developed good contacts with other intergovernmental, governmental and non-governmental organizations involved with health and health-related services.
- Although there may be other organizations willing to assist in immunization programmes, national NGOs, like Red Cross and Red Crescent Societies, have a great advantage in being supported and staffed by nationals of the country in which they work.
- National Societies have a commitment to PHC and, additionally, some of them are already involved with the Child Alive Programme, through which they are gaining valuable experience in identifying priority problems and working with high-risk groups.
- Through their previous involvement with health programmes and their network of volunteers (for example first aid, home nursing and youth), they will have gained valuable experience in encouraging "grass-root" involvement: increasing peoples' awareness of their health problems, generating discussion, stimulating community-based action and making the contact with community leaders, traditional healers and other influential people which is essential for generating community participation.
- Most National Societies will have had extensive experience in training (many either are, or have been responsible for

running large and prestigious training institutions). They will also have been involved with health education.

- As members of the League of Red Cross and Red Crescent Societies they are part of a much larger international "family" which can act as a forum for sharing ideas and experiences, disseminating the lessons learned from different programmes and providing information and expertise as required.
- Since they are NGOs, they have a flexibility that governments often do not have and as such they are in a good position to implement and support innovative programmes.

Factors affecting the degree of involvement in national immunization programmes

If it is accepted that the vaccine-preventable diseases are a priority problem and that National Societies are in an extremely strong, often unique position to strengthen and support national immunization programmes, what specific areas of involvement can be identified? Clearly the opportunities for individual societies to assist will vary, depending on a number of factors. However, whatever the involvement, two things are essential.

First, it needs to be appreciated that participation in immunization programmes is a serious and invariably long-term commitment, if improvements are to be accomplished and maintained. It is not a decision to be taken lightly since superficial involvement and short-lived enthusiasm may ultimately do more harm than good.

Secondly, there is a need for collaboration with national ministries of health and related governmental departments, intergovernmental organizations (notably WHO and UNICEF), NGOs and other participating groups. This is necessary if duplication and assistance gaps are to be avoided, lessons learned are to be shared and different agencies are to benefit from the development of training materials and techniques.

Clearly all Red Cross and Red Crescent Societies will not be able to be involved with national immunization programmes to the same degree. Their participation will be affected by a number of factors which include:

- levels of development of national ministries of health (including their commitment to PHC);
- national health priorities;
- national immunization policies and processes of planning, implementing, monitoring and evaluating immunization programmes;
- the involvement of intergovernmental organizations and other NGOs with the national immunization programme;
- the strengths and weaknesses of National Societies in terms of their available expertise and resources—different levels of involvement will require different commitments and abilities over different periods of time;
- the past and present activities and priority issues with which National Societies have been involved, for example, whether they are involved with first aid, home nursing or youth training, the development of community-based health programmes, the provision of clinic- and hospital-based services or nursing training. These will affect both the services and the institutions through which they can work.

Opportunities for participating in national immunization programmes

Red Cross and Red Crescent Societies could become involved with national immunization programmes through the following activities.

Advocacy

Advocacy is the process of persuading leaders, both national and local, that there is a problem which they can and should solve. This involves providing information, indicating possible actions, and encouraging and supporting people in positions of power to do what needs to be done. National Societies, which frequently have wide-ranging contacts with decision makers at many levels within the country, are in an excellent position to raise the issue of vaccine-preventable diseases. Such activities would support the recommendations of the NGO Group on PHC: "NGOs should be informed about the process of formulating national strategies so that they can cooperate, participate, contribute, mobilize public opinion in support of, and even pressure governments to move ahead in a manner which is consonant with the World Health Assembly resolutions they have adopted."[1]

Basically, advocacy would involve National Societies in promoting the idea of immunization through a variety of methods which would include personal contacts, lobbying strategies, using their prestige as national organizations and making bold statements at public occasions. Of course such activities should be supported by appropriate statistics relating to vaccine-preventable diseases in a national context, and will need to cover a range of alternative actions, from legislation to education and resource reallocation.

Health education

Red Cross and Red Crescent Societies are in a good position to initiate or participate in health education programmes in view of their previous involvement with such activities, their knowledge of the communities concerned and their contact with health-related sectors, such as education.

One approach to health education is to ensure that information about immunization is incorporated into all existing programmes. As an example of this, the health education manual which is produced by the Mozambique Red Cross Society, for teachers and students, includes a section on immunization (how many children have been vaccinated, what are vaccines and why are they important, and when should children be immunized?). There are many other examples of successful health education activities, such as the Ivory Coast programme which was based in schools and provided older children with information about vaccine-preventable diseases and the need for immunization. These children then spread the message in their homes and villages and distributed appointment slips for immunization. The attendance at immunization sessions was greatly increased by this programme.

Another type of approach has been successfuly used in some cities in Thailand. When birth certificates are sent to parents there is an accompanying letter from the mayor congratulating them. In addition, information is included about the national immunization programme. Parents are then sent reminder letters before their appointments and another one if they fail to attend. This programme achieved 100% improvement in the number of children fully immunized.

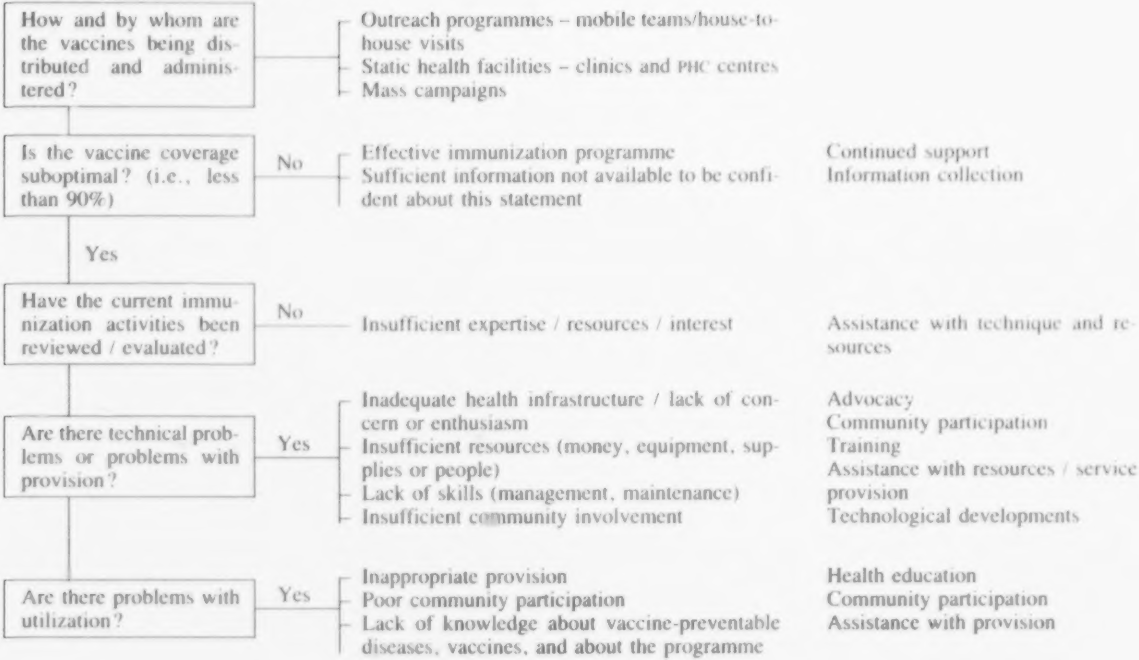
The development of imaginative educational and motivational materials and programmes will be fundamental to the improvement of vaccine coverage. These will vary depending on whether they are designed for one-to-one contact, for groups (such as youth groups or women's groups) or for the whole population, when mass media might be appropriate. In the Yemen Arab Republic, for example, a television campaign on immunization succeeded in doubling the number of people attending immunization sessions.

National Societies may be in a good position to adapt existing material, in order to make it more culturally relevant or more focused on the specific obstacles preventing their national programme from achieving wider coverage. They may also be able to experiment with different techniques such as plays, songs, loudspeakers on trucks, and slogans. The more successful health education campaigns are likely to incorporate a variety of different approaches and activities. For example, in the Sudan, an NGO collaborated with national ministries and community leaders to develop a health education campaign which included the training of extension workers in communication skills, weekly radio programmes, newspaper articles, house-to-house visits and touring loudspeaker cars. They were able to increase coverage from 10 to 40%.

During the past few years, applied knowledge about social mobilization for immunization has progressed enormously. Innovative integrated community-based strategies have now been implemented successfully on a nation-wide scale for immunization programmes in a number of politically and culturally different countries.

Some policy and planning questions about immunization programmes and possible associated actions

Questions to be asked			Possible actions
Are vaccine-preventable diseases a priority health problem?	No	- Is sufficient information available to make this statement? - Is this the result of a successful immunization programme?	Information collection Research Continued support
Yes			
Have groups at high risk from vaccine-preventable diseases been identified?	No	- Insufficient information available from routine sources - Lack of expertise / interest / concern / resources to obtain information	Information collection Research Advocacy Training and allocation of resources
Yes			
Is there a national policy on immunization and is this compatible with the overall health policy?	No	- National decision makers unaware / unconcerned about vaccine-preventable diseases	Information dissemination
		- Ministry of Health uncommitted to PHC or in conflict with donor policies	Advocacy and support
Yes			
Who is participating in the planning, implementation, surveillance and evaluation of the immunization programme?		- Ministry of Health and other ministries - UN (e.g., WHO/EPI, UNICEF) - NGOs (national and international) - The private sector, industry and commerce, the media - The «people» – community leaders, community groups, political, cultural and religious organizations, etc.	These factors will affect the type of activities which are required / possible


How and by whom are the vaccines being distributed and administered?
Outreach programmes – mobile teams/house-to-house visits
Static health facilities – clinics and PHC centres
Mass campaigns
Is the vaccine coverage suboptimal? (i.e., less than 90%)
No
Effective immunization programme
Sufficient information not available to be confident about this statement
Continued support
Information collection
Yes
Have the current immunization activities been reviewed / evaluated?
No
Insufficient expertise / resources / interest
Assistance with technique and resources
Are there technical problems or problems with provision?
Yes
Inadequate health infrastructure / lack of concern or enthusiasm
Insufficient resources (money, equipment, supplies or people)
Lack of skills (management, maintenance)
Insufficient community involvement
Advocacy
Community participation
Training
Assistance with resources / service provision
Technological developments
Are there problems with utilization?
Yes
Inappropriate provision
Poor community participation
Lack of knowledge about vaccine-preventable diseases, vaccines, and about the programme
Health education
Community participation
Assistance with provision

Community participation

Because of their previous experience in working with communities, National Societies will often be in an excellent position to generate and sustain people's interest and involvement in immunization programmes. As an initial step, sharing information with the people is clearly essential for their participation. In India, in a programme which dramatically increased the coverage of polio vaccine, a number of community groups and organizations were contacted in order to elicit their support. After training materials had been prepared, the messages were spread by children and watchmen, by door-to-door visits, and through songs, exhibitions, plays, posters, slogans on walls, banners and car-stickers.

Of course community participation consists of much more than merely ensuring that people use the services which are provided. It is a long slow process through which it is hoped that the people will become active participants in decision making, and share the responsibility for implementing, monitoring and evaluating the policies resulting from such decisions. Although they cannot expect to achieve all of this overnight, National Societies should, however, be in a strong position at least to provide an important channel through which information and ideas can flow between the people and the health services.

Training and supervision

Many National Societies will have had extensive involvement with training, from organizing programmes for volunteers to running major institutions for training nurses. They should be able to benefit immunization programmes by building on this experience. At a very minimum they could ensure that the vaccine-preventable diseases and immunization are included in all training programmes and materials for which they are responsible.

For example, the Sri Lanka Red Cross Society training curriculum for Red Cross volunteers on supporting roles for PHC contains a section on immunization. It identifies ways in which the volunteers can help to ensure community participation, assist with the running of immunization sessions, encourage the people to attend for repeat visits and maintain the children's records. In a programme in Nigeria, following a brief training course, volunteers returned to their villages where they provided the communities with general information about vaccine-preventable diseases (e.g., severity of diseases, benefits and side-effects of vaccines) and specific information about the immunization programme (e.g., who, when, where and how often). They also reminded people about repeat visits and assisted in running the immunization sessions. The result of this training was a greatly increased immunization coverage.

Clearly the type of training will depend on which groups the National Societies are currently addressing, on the nature of services they are responsible for providing and on the needs of the national immunization programme. Furthermore, it is not only important for Red Cross and Red Crescent Societies to provide training, but they should also ensure that whenever possible and appropriate their members participate in national training programmes arranged by other organizations. The Expanded Programme on Immunization (EPI), in particular, has a great deal of experience in running training courses for health workers at different levels who are involved in immunization programmes, and has developed some excellent training materials. There are likely to be many opportunities for inter-agency collaboration in the area of training, and National Societies may find it more productive in certain circumstances to be involved in sponsoring training courses rather than in providing the training themselves.

Training alone, however, is not sufficient to ensure that the necessary services are actually provided. Supervision is also needed to give ongoing support and motivation to the people working in the field, to maintain the quality of the services and to help solve unforeseen problems. The experience of National Societies in terms of supervision will therefore complement any training activities which they may initiate.

Assistance with service provision and coordination

There will be a variety of ways in which National Societies will be able to assist with the provision of immunization services.

For example:

- Red Cross and Red Crescent volunteers should be able to help with the organization of immunization sessions, both in the community (reminding people of places and times and following up defaulters) and in the health centres. In the latter setting they could assist with registration and recording during the sessions, help to keep people's individual records up-to-date, carry out health education and motivate people to return as required. Often busy health workers do not have the time to sit and talk with the people who come to their health centres. Volunteers could play an important role by being courteous, answering questions, and helping people with their problems and concerns. This in turn should improve people's use of the services provided.

- For those National Societies which are responsible for providing PHC services, the staff should ensure that the services which they offer maintain standards of good practice, so that the clinic environment and the attitudes of the staff do not act as deterrents to utilization. If immunization is provided through the clinics or through outreach programmes based on PHC centres, then every attempt should be made to provide as good and comprehensive a service as is possible.

- Red Cross and Red Crescent Societies may have opportunities to collaborate with other groups in developing new approaches to vaccine provision, because of the flexibility which is more characteristic of NGOs than national ministries of health. If such pilot projects are carefully designed and evaluated they could be of inestimable value to national governments, since they may provide an indication of more appropriate and cost-effective ways of achieving the desired immunization coverage.

During 1984 in Colombia, a national campaign succeeded in immunizing more than 800,000 children. This necessitated collaboration and cooperation between several government departments, WHO, UNICEF, the Church, mass media and a number of NGOs. The Colombian Red Cross Society played an active part in this programme training more than 13,000 of its members to be vaccinators and an additional 16,000 to help with organization and record keeping. As well as helping with the provision of services, National Societies will also often be in an excellent position to assist with coordination and to ensure that the initial momentum of immunization campaigns is maintained. There will be many opportunities to work with other NGOs and national movements, such as CHILD-to-Child programmes, and this type of collaboration could be initiated and actively supported by National Societies through regular meetings, seminars and workshops.

Financial support and assistance with other resources

This section has implications both for National Societies in their own countries and for those which are in a position to support the activities of other National Societies. A good example of this is the immunization activities which are being provided in Pakistan through the collaboration of the Pakistan Red Crescent Society, the Red Cross Society of the Federal Republic of Germany and WHO/EPI. Such assistance might include the sponsorship of training courses or the purchase of vaccines and equipment—for example vehicles, syringes and needles, sterilization and cold chain equipment. In 1979, the Save the Children Fund launched a "Stop Polio Campaign" and has since supported immunization programmes in 16 countries. This support has included a variety of activities including the purchase of vaccines, equipment and supplies, the running of training programmes for management and maintenance and the secondment of technical experts and advisers.

Support for immunization should not be embarked upon without sufficient consideration for the long-term implications. The costs of immunization programmes are likely to be higher during the initial development period and additional support during this phase may be particularly appropriate. However, many costs will continue for the life of the programme and most capital investments will generate recurrent costs in the years to come. It is probably wisest therefore not to embark upon such involvement unless there are assurances that the government or some other organization is willing and able to take over these costs in the future.

Information collection and dissemination, and applied research

It has already been indicated that Red Cross and Red Crescent volunteers could assist with the collection of routine information during immunization sessions. However, there are many other data which National Societies might help to collect in collaboration with national ministries and intergovernmental organizations. For example, if not already available, information will be needed about:

- the extent of the problem posed by vaccine-preventable diseases, in particular the identification of high-risk groups;
- the attitudes of people to these priority diseases and to the concept of immunization in general—information which is essential if health education programmes are to be appropriately directed;
- the coverage and impact of vaccines which have been administered: is the programme successfully achieving its stated objectives?
- the times and places which would be convenient for people to attend for immunization and the reasons for non-attendance—important information in terms of ensuring appropriate provision and effective utilization;
- the reasons why coverage is suboptimal: what are the obstacles to universal immunization in terms of either the provision of services or their utilization?

Much of this information will need to be collected by community surveys, and National Societies could be actively involved with these in a number of ways, from encouraging people to participate to actually collecting the information.

However, it is not enough just to collect information. The results need to be fed back to the people working in the field. In addition, there are always needs for improving the channels of communication and developing new ways for exchanging ideas, sharing information and disseminating recent advances. At one level this can be achieved by the National Societies organizing meetings and workshops—the Save the Children Fund, for example, regularly runs an international conference for EPI managers.

Newsletters can provide another important means of communicating with health workers. A newsletter called ... *by the year 1990*,[2] specifically devoted to immunization problems in developing countries, is currently produced in England. It covers many issues related to immunization, including short articles and information about new projects and recent advances. Such an initiative at a national level could be extremely helpful to the development and expansion of immunization programmes and would be a simple useful project for Red Cross and Red Crescent Societies to initiate.

Often people have rather negative feelings about "research"—thinking that it is the domain of academics and that it is unrelated to problems in the real world. However, the collection of basic, essential information about peoples' attitudes and their use of the services (as previously outlined) is a type of research. Furthermore, it is only by learning about the current situation that programmes can be monitored or evaluated. Small, well-planned applied research projects may help to clarify the issues, identify defects and avoid major problems and poor use of resources in the future. In addition, there may be a place for supporting "appropriate technology" developments which are directed towards particular national problems—in the same way that Red Cross and Red Crescent Societies might support the development of appropriate aids for the disabled. In Nigeria, for example the immunization coverage in one district was increased from [illegible] to 80% in a little over 12 months. This was partly related to effective community participation and the use of a wide range of groups and techniques for health education. It was also due to the development of improved cold boxes which facilitated the storage and distribution of the vaccines.

Immunization and PHC

There is currently an ongoing debate in the field of health care which has particular relevance to immunization programmes. Simply put, there are on the one hand those people who believe that since most health problems have their origins as much in the prevailing political and socio-economic conditions as they do in the physical and biological environments in which people live, a broad-based development approach to health care is the most important thing. They consider that we should concentrate on ensuring that all PHC activities are provided appropriately, equitably, with an emphasis on prevention, involving health-related sectors and stimulating and supporting community participation. This is the essence of PHC to which Red Cross and Red Crescent Societies have clearly committed themselves in previous General Assembly resolutions.

What needs to be appreciated about PHC, however, is that it is difficult to implement nation-wide and that the results will take many years to materialize. In most developing countries the necessary improvements in people's living and working conditions will only slowly take place and it will also be many years before the necessary infrastructural developments are supported, and health services have expanded appropriately and equitably. Furthermore, it will be some time before most communities become meaningfully involved in all aspects of their own health care. In the meantime, it is possible that certain interventions could both improve people's health and act as a springboard to expedite these other developments.

This is the approach of the supporters of the other side of the debate, who believe that the best way to use our limited resources is by implementing specific activities which are effective and which have relatively rapid and easily measurable results. The main criticism of this latter approach is that whilst an impressive building may be constructed, it may not be particularly functional nor is it likely to last very long if the foundations are weak or even non-existent. The critics of selective interventions contend that since the factors responsible for ill-health are many and interrelated, it is somewhat unrealistic to expect major improvements in people's health to occur simply by concentrating on one or two isolated interventions.

Of course, ideally, all PHC activities should be integrated, with a number of programmes combining to create a process of development through which people's health status is improved in terms of their physical, mental and social well-being. All of the PHC activities are important for the improvement of people's health since they each have different impacts on the many factors which cause people to become ill. In addition, when the different activities are provided as a "package", this makes better use of people's time (both the health workers and the members of the community), and may encourage people to use more than one service. This is particularly important for preventive activities which are traditionally underprovided and underutilized.

However, what is being increasingly appreciated is that the two approaches outlined above are not necessarily incompatible. So long as these individual programmes are seen to be within the broader context of PHC, and not merely as an end in themselves, then they afford an excellent opportunity to provide health workers at all levels within the health service with skills in generating and maintaining community participation, in management and logistics, in training, and in developing the expertise necessary for planning, implementing, monitoring and evaluating health programmes. These skills will clearly benefit all aspects of PHC. In addition, such programmes can produce relatively rapid results which are obviously a boost and a stimulus to health workers and communities alike.

How, then, should the principles of PHC influence our approach to the provision of immunization services?

Relevance to PHC principles

Prevention

It makes little sense to provide services for physically or mentally disabled people if, at the same time, we do not also become involved in ensuring that everything is being done to prevent the diseases which cause these disabilities. Since all diseases are not preventable and others can only be prevented with difficulty, it is important to concentrate on those diseases which are relatively easy to prevent, such as the vaccine-preventable diseases. However, this is not to imply that diagnostic, curative and rehabilitative services are unnecessary; clearly these will continue to be required. It is not a matter of "either/or", but a question of balance between the resources directed to prevention and those which are committed to the other aspects of disease control.

Equity

It is often the most deprived groups in a country who suffer most severely from infectious diseases. It is usually these very same groups whose health services are most underdeveloped and who are least likely to know about the need for immunization. This means that groups with the greatest problems are also those who are likely to have the worst provision and utilization of immunization services. In most countries these are rural communities and the urban poor.

Appropriateness

Immunization programmes will need to be relevant to the needs of the people and also to the capacity of the country to support them. These factors should therefore influence decisions about the design of immunization programmes (e.g., static, outreach or mass campaign), the provision of services (when, where and how often), immunization schedules and methods of administering the vaccines. They should also affect certain technical details, such as the methods for maintaining the "cold chain".

Community participation

The people who are intended to benefit from the immunization programme need to participate in a number of ways. Communities should be actively involved, which means that knowledge should be shared with them, they should be encouraged to discuss the issues, and contact should be made with recognized leaders, decision makers, traditional healers, respected individuals and community groups in order to obtain their support and enthusiasm. Ideally a stage should be reached when the people demand the service and there is a flow of ideas and information between the people and the health services, such that communities are in a position to help with the planning, implementation, surveillance and evaluation of the programme. The beneficiaries should also participate in terms of using the services, which means that they must have sufficient information about vaccine-preventable diseases and immunization programmes to make the appropriate decisions.

Intersectoral cooperation

It will be clear from even a superficial understanding of immunization programmes that the effective control of vaccine-preventable diseases will depend on the collaboration of many different groups. These include, amongst others, health, education and community development—from ministerial to community level—, cultural and religious leaders, the private sector and the mass media. It is therefore essential that all these different groups appreciate the need for immunization and are willing to work together towards the common objective of ensuring adequate immunization coverage and the control of vaccine-preventable diseases.

No conflict between traditional activities of National Societies and this new challenge

Measles, diphtheria, pertussis, tetanus, polio and tuberculosis are major causes of morbidity, disability and death amongst children in developing countries. Each year they are responsible for approximately 4 million deaths and additionally, as a result of these diseases about 4 million children become physically or mentally handicapped.

The Red Cross was originally initiated by one man's concern about unnecessary suffering and death. Since we have vaccines which are effective, relatively cheap, and which generally provide lasting protection against these diseases with few side-effects, the suffering and death caused by the vaccine-preventable diseases are unnecessary. Can Red Cross and Red Crescent Societies again rise to the challenge? The General Assembly resolutions relating to PHC in general, to the Child Alive Programme and now to immunization indicate that they both can and should.

Immunization is one of the activities of PHC, to which the League of Red Cross and Red Crescent Societies and individual National Societies are already committed. This commitment to PHC is an essential aspect of the changing emphasis and focus of Red Cross and Red Crescent Societies. It stems from an appreciation of the need for relief activities to take place within a framework of development and for National Societies to provide challenging roles for their volunteers by involving them with priority health problems, both nationally and internationally.

There is no conflict between the more traditional activities of National Societies and their involvement with this new challenge. The participation of Red Cross and Red Crescent Societies in national immunization programmes will not only improve their ability to respond in relief situations but it will also decrease the impact of disasters and population displacements, by ensuring, in particular, that people are protected from contracting measles before the event. Furthermore, it will provide National Societies with a real opportunity to have a significant impact on diseases which seriously undermine the communities with which they work.

Despite the current sometimes rather depressing picture of vaccine-preventable diseases in developing countries we should not feel pessimistic. The eradication of smallpox during the 1970s has shown what can be achieved by a clear understanding of the problem, the allocation of sufficient resources and a strong commitment to do what needs to be done. Major advances have also been achieved in the control of vaccine-preventable diseases during the past few years in a number of developing countries including Brazil, Colombia, India, Nigeria, Pakistan and many others. These developments have relied on the guiding principles of making the vaccines more accessible to all the people and making the people more enthusiastic about using the immunization services—in other words by improving provision and utilization.

It is not envisaged that Red Cross and Red Crescent Societies will ever be responsible for making national immunization policy decisions or for setting up immunization programmes—the provision of vaccines is not something for "going-it-alone". However, it is clear that they could have an important role to play in the control of vaccine-preventable diseases by strongly advocating the development of appropriate policies and programmes, by providing trained health workers and volunteers to collaborate with and support national initiatives and by helping to ensure that the resources which are available are not wasted.

Basically, National Societies have two types of decisions to make concerning their possible participation in national immunization programmes:

- policy decisions—do they want to become involved with the control of vaccine-preventable diseases?
- operational decisions—how can they transform these policies into action?

Hopefully the previous sections of this paper will have convinced National Societies that these are important diseases, and that they have a major contribution to make towards their prevention. The annexes have been designed to provide Red Cross and Red Crescent Societies with a structured approach to making some of the decisions about what needs to be done and about how this could best be accomplished.

For further information on immunization or other components of the Child Alive Programme, write to: The Programme Coordinator, Child Alive Programme, League of Red Cross and Red Crescent Societies, P.O. Box 372, CH-1211 Geneva 19, Switzerland.

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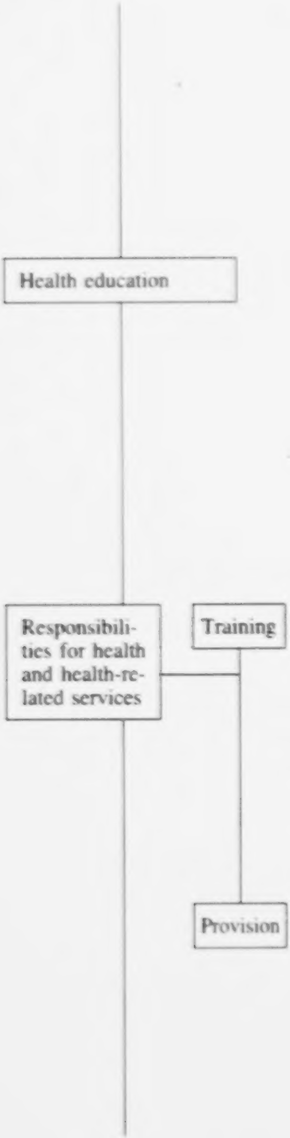
[1] *The role of non-governmental organizations in formulating strategies for health for all by the year 2000*, position paper elaborated by the NGO Group on PHC, Geneva, 1981.

[2] For further information contact: The Editor, Wildhanger, Amberey, Arrundel, West Sussex, BN 18 9NR, England.

ANNEX 1

Suggestions for Red Cross/Red Crescent Societies' involvement with national immunization programmes based on their current activities

Current activities	**Opportunities for involvement with national immunization programmes**
Dialogue with national leaders and health-related ministries	• Advocacy, in terms of outlining the problems of vaccine-preventable diseases and stimulating commitment and enthusiasm for implementing appropriate policies and actions.
Relief programmes	• Develop and consolidate links with national ministries and intergovernmental organizations (WHO, UNICEF) concerned with vaccine storage and distribution.
	• Use experience and abilities developed during relief activities to expand into assisting with the provision of vaccines to stable communities.
	• Involvement with routine immunization as an aspect of pre-planning, to mitigate the effects of population displacements or disasters.
	• Ensure that both refugees and host communities are vaccinated against measles (as a minimum response).
Information collection and dissemination	• Ensure that information about immunization is obtained during routine information collection (e.g., at clinics) and when community surveys are carried out (e.g., Child Alive projects).



- Include information about immunization status on individual records (e.g., Road to Health charts).

- Use existing newsletters and other publications to inform people about vaccine-preventable diseases and the national immunization programme.

- Endeavour to include information about PHC, vaccine-preventable diseases, immunization (benefits and side-effects) and immunization sessions (where, when and how often) in all health education programmes and training courses.

- Experiment with new methods of health education (e.g., plays and songs) and collaborate with or initiate the involvement of the press and mass media.

- Ensure that both general and specific information about immunization is included in all training programmes (e.g., volunteers and nurses).

- Assist with specific training for immunization campaigns – either by running training programmes or by sponsoring other organizations or participants.

- Where appropriate, include information about immunization as one of the services which are provided by Red Cross/Red Crescent health workers in hospitals and clinics.

- Expand the role of volunteers to include health education, assistance with immunization sessions and follow-up of defaulters.

Primary health care and Child Alive Programmes
Already actively involved with national immunization programmes

- Help with mass immunization campaigns and assist with maintaining their momentum.
- Link the provision of immunization services to the other basic activities of PHC.
- Encourage more community involvement and participation in the planning, implementation, surveillance and evaluation of immunization programmes.
- Ensure that immunization activities are appropriate and equitably distributed.
- Develop and expand contacts with other groups and organizations involved with immunization.
- Consolidate and evaluate current activities.
- Help to identify and alleviate obstacles to satisfactory coverage.
- Improve role in coordination (e.g., initiate workshops).
- Expand activities into new (geographical) communities and into new vaccine-related activities (e.g., publish and distribute a newsletter).
- Provide continued support (remembering immunization is an ongoing long-term commitment).

ANNEX 2

Planning guidelines for involvement in national immunization programmes

Describing the problem

- The collection of information about vaccine-preventable diseases from as many sources as possible (e.g., annual reports, hospital and clinic records, health workers, community representatives, etc.).
- Discussions with members of the Ministry of Health, intergovernmental organizations (e.g., WHO/EPI and UNICEF), PHC programmes and community leaders to gauge their attitudes towards vaccine-preventable diseases and determine their current policies and actions.

Deciding on priorities

- If vaccine-preventable diseases are a major cause of disease, disability and death, and immunization coverage is less than 90%, what are the main obstacles to more effective control?
- In the light of past activities and current resources, how could the Red Cross and Red Crescent Societies help to improve the vaccine coverage and the control of vaccine-preventable diseases?

Stating objectives

- Having decided what needs to be done (in general) and what the National Society could do in terms of its expertise, activities and resources, it is necessary to state explicitly what it hopes to achieve by its participation in the national immunization programme (the objectives).

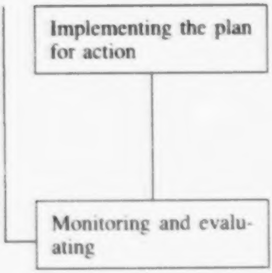
- In deciding on the objectives it is essential that there should be agreement within the National Society – assistance with immunization programmes is a long-term commitment and it will need everyone's support.
- Choose some measurements which will enable the objectives to be evaluated (it is important to be able to assess whether the programme has achieved what it set out to achieve).

Examining alternative solutions

- After deciding on the objectives it is necessary to examine different ways of achieving them.
- Discuss the problem with other intergovernmental, national and non-governmental organizations in order to identify the strengths and weaknesses of their programmes, to learn from their successes and failures.
- Discuss the problems with the communities involved – what do they think about the alternative solutions?
- Be innovative and imaginative!

Selecting a plan for action

- Choose the solution which appears likely to provide the best results with the least expenditure of resources (clearly this decision will be influenced by the National Society's abilities and resources in terms of people, time, money, equipment, facilities, etc).
- Carry out detailed planning.
- Ensure the availability of sufficient resources and funds to do what has been decided needs to be done.


Implementing the plan for action
Monitoring and evaluating

- Elect a committee to be responsible for implementing, monitoring and evaluating the programme (it may be necessary to do this during one of the previous stages); involve (harness the enthusiasm) of an «expert»; involve the community.

- Review the programme regularly: are the objectives being achieved? is the programme accomplishing what it set out to accomplish? if not, why not? how should the programme be changed?

Guide to action

PolioPlus programme

Criteria for funding of polio immunization programmes

Rotary Foundation
Evanston, Illinois

To date, the Rotary Foundation of Rotary International has allocated over US$ 12 million for polio immunization programmes in 26 countries to protect more than 87 million children and has pledged to raise US$ 120 million within three years. The first major polio immunization project assisted was launched in the Philippines in 1980. On 14 May 1985, Rotary joined PAHO/WHO in the goal to eradicate polio in the Americas by 1990.

Rotarians have provided support to many recent accelerated immunization programmes in cooperation with governments, UNICEF and WHO.

In February 1985, Rotary International announced its commitment to help control polio world-wide by the date of Rotary's centennial, 2005. In June 1985, the programme acquired the name "PolioPlus—to Immunize the Children of the World", in recognition that control of polio is only one sector of the battle to improve child health, and that PolioPlus should support and complement the goals of the Expanded Programme on Immunization (EPI) of WHO. Furthermore, it is recognized that EPI itself is part of a broader primary health care strategy to improve child health and to reduce the 15 million child deaths that occur annually, some 3.5 to 5 million of which result from vaccine-preventable diseases.

Through its PolioPlus programme:

1) Rotary will provide all the polio vaccines necessary for up to five consecutive years for any approved city, state, country, or regional immunization programme—either as part of annual national days of immunization against polio or through other delivery tactics, in overall support of WHO's Expanded Programme on Immunization (PolioPlus funds may be expended for other vaccines as well as polio vaccines, but the primary emphasis is on polio.)

2) Rotary will make available to any less developed country, upon invitation, a team of experts to help assess, implement, and evaluate a plan for annual national days of immunization against polio. In each country targeted for such campaigns, a committee of Rotarians, in conjunction with Rotary's expert team and national and local health officials, will seek to motivate and utilize resources of the private business and professional sectors to complement those of the formal health care system.

This paper presents criteria for use by programme administrators concerning:

a) what constitutes an "approved" immunization programme;

b) conditions required for participation of the Rotary International Immunization Task Force in an approved programme;

c) activities of national Rotary committees, whose purpose is to develop and involve business and private sectors in support of immunization activities.

a) Approved immunization programme

Rotary will provide polio vaccine for up to five consecutive years for any city, state, country, or regional immunization programme on the following conditions:

- the programme has the approval of the appropriate government health authority;
- a hold harmless agreement is provided, by the state or national government, with a letter from legal counsel certifying that it is adequate and enforceable;

- the request is made through a Rotary club, or district, or group of clubs;
- the programme, after review by such agencies as WHO, PAHO, UNICEF, and Rotary International, is adjudged to be complementary to and supportive of the objectives of the Expanded Programme on Immunization of WHO;
- in the programme, efforts are made to coordinate Rotary collaboration with that of other major public or private donors;
- the programme has the goal of reaching 80% or more of children in the target age range and target geographical area;
- the programme must be capable of being sustained and there should be assurance that government-sponsored or other health delivery methods can sustain desirable levels of immunization at the conclusion of the grant period;
- Rotarians are involved in the programme in management, communications, logistics, social mobilization, or community organization;
- the programme, if limited to polio immunization, serves as an impetus to subsequent multiple-antigen programmes (e.g., measles, DPT, tetanus toxoid, BCG) and where appropriate the promulgation of other maternal and child health information related to growth monitoring, nutrition, oral rehydration therapy techniques, breast-feeding, and family spacing;
- polio vaccine provided by Rotary is free of import or other impositions;
- Rotary's contribution is appropriately recognized and publicized by government and/or collaborating agencies;
- funds granted for vaccine purchase may not be spent on other immunization programme needs, unless specifically authorized;
- the programme can be subject to ongoing review and open to final evaluation and assessment by Rotary in collaboration with other agencies as appropriate.

b) Rotary International Immunization Task Force

Rotary will make available to any developing country one or more members of the Rotary International Immunization Task Force, subject to the following conditions:

- an invitation is received from the national or state minister of health requesting assistance in assessing, planning, and implementing a plan for accelerated immunization activities, such as annual national days of immunization against polio and/or other EPI diseases. In addition, the Task Force can help Rotarians assist any accelerated immunization programme which may involve EPI strategies other than or in addition to immunization day strategies;
- a country evaluation conducted by the health ministry or WHO indicates that an intensive effort can effect lasting benefits, and that the government has the intention to continue to sustain high levels of immunizations;
- Rotarians of the area express commitment to assisting the effort through personal involvement and helping to mobilize resources of private business, professional and other sectors.

c) National or area Rotary committees to support immunization days

In each area or country selected for a grant and/or participation by the Rotary International Immunization Task Force, a national or area task force of Rotarians will be formed to develop and utilize the following kinds of assistance from Rotarians and from business, private, public and other sectors in support of the immunization delivery programme adopted by the government health authorities.

Policy formation:

- express Rotary interest and support to government leaders and health officials at appropriate levels;
- encourage government planning to undertake and fund accelerated immunization strategies and to increase commit-

ment to building an adequate primary health care infrastructure.

Communication—creating public awareness of the need for and benefits of immunization:

- informing Rotarians through manuals, films, and slide-sets;
- sponsoring broadcast media messages as well as communications through employers, schools, and religious institutions;
- local publicity through posters, newspapers, advertisements, billboards, flyers, etc.;
- informing parents of the need to vaccinate their children through household and workplace visits and community meetings.

Logistics:

- printed materials such as forms, posters, training manuals, schedules, etc.;
- identifying, obtaining and training volunteers;
- cold chain maintenance of cold boxes, ice, thermoses, refrigerators, vehicles, fuel;
- personal service as vaccinators, registrars, supervisors;
- providing vehicles and fuel for cold chain, vaccine delivery, and transport of personnel;
- census activities to identify household and/or persons needing immunizations;
- participation in formal EPI programme reviews;
- strengthening the health care centres' infrastructures, including providing supplies and equipment, funding training of health care workers, and physical improvements to health facilities;
- inventory of resources available through local Rotarians to meet immunization campaign needs;
- evaluation surveys to assess coverage obtained.

Fund-raising and publicity:

- sponsoring local and area fund-raising efforts to obtain contribution in funds or in kind to support immunization efforts;
- publicizing Rotary's involvement and objectives in immunization.

Guide to action

Channelling, a new immunization strategy

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In 1981, with PAHO/WHO technical assistance, the Ministry of Health designed what is known as the channelling strategy, aimed at improving immunization coverage. This name was given because the strategy is designed to establish communication channels through direct action aimed at promoting health. Health workers and community leaders or guides conduct household visits to identify unvaccinated children or those with incomplete vaccination schedules and "channel" them to health centres or health posts.

The channelling strategy developed in Colombia was briefly mentioned in the case study on the Colombian Vaccination Crusade of 1984.[1] *It is now being employed for ORT and other PHC components in the Colombian Child Survival and Development Plan, 1985-1987. In the meantime, other countries have adopted the channelling strategy, which is described below.*

The need for a more effective strategy

The need to offer more efficient and effective preventive health services in Colombia was the rationale for a study, undertaken between December 1980 and February 1981, of the problems that had arisen in implementing the immunization programme, which concluded with an analysis of the principal causes of inefficiency and low effectiveness.

The study demonstrated that in the national health system of Colombia:[2]

> "The major part of effort and of the available resources was allocated to curative services by contrast with the low amount allocated to public health activities oriented towards health promotion and preventive care relating to non-perceived needs..." "The human, physical and financial resources were sufficient..." "The network of health services reached over 80% of the population..." "There were sufficient vaccines to immunize all children under 4 years of age and pregnant women..." "The cold chain was adequate to allow the implementation of existing programmes, as were the human resources available, which while not of an excellent standard could be considered sufficient to respond to the needs..." "However, despite all this, it was of great concern that vaccination coverage nation-wide for polio, DPT and measles was under 20%."

On the basis of the findings of this study, a method was proposed to address the problems within the context of primary health care, taking into account the principles formulated at Alma Ata in 1978:[3]

> "Primary health care is essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination." ... "It is the first level of contact of individuals, the family and community with the national health system bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process."

Consequently, a new immunization strategy was designed, known as channelling because of its specific characteristics. The strategy led to a systematic process of transformation within the health sector in which immunization activities became a priority. A progressive and sustained increase in vaccination coverage resulted, as well as a significant decrease in the drop-out rates between the first and third doses of DPT and polio vaccines, greater rationalization in the use of resources, greater accuracy in calculation of the target populations, better planning of routine immunization activities, increased community participation as a result of promotional and educational activities, and a significant expansion of health services because of increased outreach activities. These improvements in turn led to a decrease in both morbidity and mortality rates of the EPI diseases: diphtheria, tetanus, pertussis, poliomyelitis, measles and tuberculosis.

These developments, which for the most part could be attributed to the channelling strategy, facilitated its broader acceptance by the Sectional Health Services and its rapid implementation throughout the country. It was to become the critical methodological tool in the successful implementation of an accelerated EPI, organized through national vaccination days, and was to increase access to services dramatically by bringing them within reach of the community in geographical, financial, cultural and functional terms.

Although the channelling strategy can be compared with various other methods used in offering vaccination services, it is of interest not only in terms of operational considerations but because it is based on an examination of the causes of inefficiency and ineffectiveness of traditional immunization strategies and aims to promote changes in knowledge, attitudes and practices at the levels of both the health sector and the community.

Planning immunization services

Immunization programmes originate in the health policies of countries aiming to improve the health status of communities through the use of appropriate technologies. In the specific case of immunization, programming has traditionally focused on three basic strategies:

a) the routine strategy: immunization services are offered by the state through the health sector on demand;

b) the mass campaign/mobilization strategy: the mass media inform the population and motivate them to come to traditional public gathering places on determined dates when vaccination services are offered;

c) the house-to-house strategy: the health services are supported by efficient management and have sufficient resources available to allow home vaccination to be offered.

These three immunization strategies are similar in their objectives in general terms but not in their methods, results and costs. The mass campaign strategy gives good results when the aim is a rapid increase in coverage rates for vaccines that can be given in a single dose, such as the measles vaccine; the yellow fever vaccine produces even more dramatic results.

The routine strategy will be the strategy of the future for developing countries once health systems have overcome the constraints to which they are currently subject: fixed working hours; too rigid a regard for contraindications of minor importance; the temptation to make false economies and not vaccinate a child in order to avoid vaccine wastage; and failure to take sufficient account of new knowledge in these areas. Once these constraints have been eliminated, the community will recover its confidence in preventive health services, which are of great importance.

The house-to-house strategy is the most costly of all, as it requires extensive administrative support and sophisticated planning, together with considerable resources of all kinds. Operationally, it does not usually enable regional or national coverage to be achieved because specific human resources are needed which may be mobilized at the local level but cannot be guaranteed on a larger scale comprising both urban and rural areas.

The above analysis clearly shows that none of the three strategies can be adopted alone to form the basis of an effective national programme, although each presents advantages in specific circumstances:

- the mass campaign strategy must be the basic strategy adopted to prevent epidemics in endemic and isolated areas, as in the case of the unimmunized migrant population exposed to the risk of yellow fever;

- the house-to-house strategy remains the most effective strategy in local epidemics of vaccine-preventable diseases which can be brought under control using "containment" techniques;
- the routine strategy requires a high level of participation by the community in health care activities.

The channelling strategy incorporates all the advantages of the above three strategies, and the results are further improved by the addition of some new elements. These include the rationalization of resources in time and space; extending the knowledge and changing the attitudes and practices of both the health workers and the community; planning, implementation and control at the operational level, leading to the adoption of innovations specifically designed for different areas and communities (e.g., urban, rural, marginal or neglected); and mobilizing the community to participate in preventing future health care problems which would otherwise necessitate complex treatment by qualified personnel who are not always available.

Definition, principles and operation

Channelling is an EPI strategy carried out at the operational levels of the national health system. The planning, implementation, vaccination process control, promotional and community education activities making up the strategy enable a permanent link to be established between the community and the health unit through the support and cooperation of community leaders, with the aim of directing users or the at-risk population towards the static or outreach facilities available.

Basic principles

The basic principles of the channelling strategy are:

1) to bring about a change of attitudes in the health sector with a view to its working more closely with the community;

2) to promote the active participation of the community in health programmes;

3) to rationalize the use of human resources;

4) to develop organization and discipline within the vaccination process;

5) to improve the accessibility of vaccination services.

Operation of the channelling strategy

Map making

For urban areas, the map of the municipal capital drawn up by the District Planning Office or Environmental Sanitation Office is used as a reference, and is reviewed to check that all houses and blocks making up the area are shown on it. If any neighbourhood is missing, the map must be updated.

For rural areas, a map of each village is drawn up showing the geographical distribution of the houses, main roads and the most important geographical features.

Indication of work areas on the sector map

The number of houses visited daily by the health official is called a work area. The number of houses in each work area is calculated on the basis of a proposed visit schedule of 50 houses per day in urban areas, and 12 to 25 a day in rural areas, depending on how scattered the houses are. Each work area is marked in crayon on the map and numbered sequentially.

Twelve work areas per sector

In urban areas, nursing aides and auxiliaries visit one work area on one day a week, and administer vaccinations the same day or the next, making use of one of the houses in the area if the distance from a health unit is too great.

After 12 weeks (three months) they will have visited the entire sector (first round) and will begin again in area no. 1, until all 12 areas have again been covered (second round) and so on until the entire at-risk population of the sector has been fully immunized.

In rural areas, the distribution of work areas has to take account of the geographical situation, the distances between houses and from villages to the health unit, etc. For example, isolated settlements are divided into three areas; the health promoter visits each area prior to the monthly meeting at the health unit, and on the day of the meeting collects the supplies required for the following day's vaccinations.

In urban areas, in order to facilitate the work and handling of census materials, a map of each area is extracted from the larger map, enabling all houses to be identified and any not shown to be noted.

Allocation of sectors

A sector comprises 12 work areas. Once the sector boundaries have been defined, the officials responsible for administering vaccinations are assigned to them.

Two alternatives may be considered:

1) if the official can only devote one and a half days a week to channelling because he has to carry out other activities, he will be allocated a sector comprising 12 areas which he must cover in three months;

2) if he works exclusively on the immunization programme, he is assigned three 12-area sectors to be covered in three months.

Promotional visit and census taking

The health official visits the homes in each work area with a community leader from the same area.

The purpose of the visit is to give families information about:

a) the importance and necessity of immunization;

b) parents' responsibility for their children's health;

c) the date and place of vaccination;

d) the importance of cooperating in providing the information needed for the census;

e) attending the vaccination sessions on the dates set;

f) keeping the vaccination certificate safe;

g) any other recommendations if potential health problems are identified in the family.

Requests for vaccines and vaccination equipment

When the numbers to be immunized are known, the health official orders the vaccines and other vaccination supplies required, adding 20% to the estimated requirement to cover contingencies.

Immunization

On the day set for immunization the health official vaccinates the population convened in the specified place. The community leader checks attendance and follows up on drop-outs. Drop-outs must be visited at least three times in order to motivate them to make use of the service. If failure to attend persists, the health official's immediate supervisor is informed so that appropriate steps can be taken.

Completion of forms

Officials must complete the following forms:

- a census form;
- a consolidated form showing channelling by round and sector;
- a daily vaccination register;
- the individual vaccination card in duplicate. The original is given to the person vaccinated and the copy filed at the health unit in order to avoid having to revaccinate children and pregnant women who lose their cards; if the child's card is available, the date of vaccination is recorded on it for the use of the family and the original is filed.

Interpretation of results

The channelling strategy should be evaluated from different angles, in addition to the analysis of the efficiency (coverage, cost effectiveness, appropriateness, accessibility, etc.) and effectiveness (decrease in morbidity and mortality rates) of programmes using it.

It is essential to evaluate what has been achieved in terms of the principles of channelling as a whole, as this is the only way in which its impact can be assessed. An isolated analysis of only one of its underlying principles would not be representative of the entire strategy. This is why indicators must be used that allow both the community and health personnel to evaluate their own work and, by this means, the strategy as a whole. Simple indicators must be selected on the basis of a joint investigation undertaken by the community and health sector personnel. For example, the changes in attitude of health sector personnel as a result of their going out into the community can be measured by indicators such as the support given to the strategy, its rate of expansion, and the increase in outreach programmes.

The degree of participation by the community and health personnel in immunization programmes reflects both the involvement of community leaders in census activities, and the cooperation from the mass media and the private sector in general in health activities. Participation in immunization activities by people who have no direct relation to the health sector must be considered to be another indicator.

Each of the principles of the strategy can easily be evaluated in this way in addition to conventional monitoring of the effectiveness and efficiency of the programme. Indeed, it is only in this context that the strategy can be properly evaluated. Every health service must estimate at what intervals evaluations should be conducted in order to take any corrective action required by the goals assigned.

Discussion

The channelling strategy represents a national example of appropriate health technology. It is the result of a detailed analysis of previous immunization activities and of their low impact, and has led to the sustained development of the most important element of this technology, which we call the "logical component". Without it, the transfer of technology comprising only physical components such as equipment, supplies, etc., would merely reflect commercial interests, and would not in itself solve the problems.

The term "logical component" means the intangible elements of this technology[4] (knowledge, education, experience, attitudes and administrative capabilities). As the inputs to the immunization programme essentially consist of existing resources, there is little doubt that the increase in coverage is the result of an intellectual movement that originated in the health sector and expanded to the community.

This movement has contributed to an analysis of the health system concerning the low impact of the services offered, their inaccessibility, administrative inefficiency, the scepticism of communities with regard to the services offered by the state, and the underlying assumption that the health sector alone is the sole purveyor of health services. The analysis led to questioning of the training of health personnel, and highlighted the two fundamental aspects of the concept of health delivery—prevention and cure.

The channelling strategy arose as a specific response to the problems of immunization. The channelling concept and process should be taken into account in formulating primary health care activities, since the strategy allows programming and management control to be conducted at the same operational level. The result is a feedback model in which communities actively participate through their leaders, and are not simply the passive recipients of health services that are not always centred on their real needs and concerns.

The channelling concept would not have developed as an appropriate technology if a favourable social and political climate had not existed. The capacity of the country to identify its problems and generate its own solutions is a consequence of self-criticism, research, and above all, self-confidence. Even so, like all other primary health care components, channelling is only a transitional strategy between the existing static health system which has a low impact, and the future system of prevention and self-care.

The concept and operation of this strategy are such that it facilitates the introduction of other health actions and messages. When further primary health care programmes are designed, channelling must therefore be considered a priority. Its positive results in Colombia may serve as an example to others of applied appropriate health technology.

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[3] *Primary Health Care. Report of the International Conference on Primary Health Care, Alma-Ata, USSR, 6-12 September 1978*, WHO, Geneva, 1978.

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Eight diseases and their vaccines

MEASLES

An acute, highly communicable viral disease caused by the measles virus, with a fatality rate of 5% or much more in malnourished populations. Measles is one of the leading causes of death among young children in the developing countries. Complications include diarrhoea, pneumonia, otitis media, malnutrition, and occasionally encephalitis. In temperate climates, it occurs primarily in late winter and early spring, while in tropical climates it is more common in the dry season. It is endemic in densely populated areas, while periodic outbreaks occur in less populated areas. Measles is a virtually universal disease in non-immune, exposed populations. The highest number of cases is usually observed among children under 2 years of age in the developing countries, and at school entry in the more affluent countries, with the greatest risk of complications and death occurring in infants.

Transmission

Transmission is person-to-person by droplet spread from nasal or pharyngeal secretions. Measles is one of the most contagious diseases. Cases are infectious even before the appearance of the rash and up to seven days after.

Incubation period

The incubation period is between eight to 13 days, usually 10 days.

Clinical features

The first symptoms are sometimes coryza, conjunctivitis and cough for three to seven days, followed by a generalized rash which lasts between four and six days.

Prevention

Natural disease usually gives permanent immunity. Infants born of mothers who have had the disease are usually immune for approximately the first six to eight months. Prevention is by appropriate immunization.

Use of the further-attenuated live measles virus vaccine is currently recommended. The vaccine stability has improved.

Administration

The vaccine is administered by injection in one dose. It may be given concurrently with DPT and polio vaccines.

Immunization schedule

There are two considerations when determining the minimal age to administer measles vaccine: age distribution of cases and deaths, and the immunological response (maternal antibody interference). In developing countries, where the disease is common and causes serious complications in young children, it is recommended to give the vaccine at 9 months of age. In industrialized countries, it is given between 12 to 15 months of age.

Efficacy

The vaccine is usually 90 to 95% effective if administered at an appropriate age, and provides long-lasting immunity.

Side-effects

A mild fever and rash lasting one to three days may occur in up to 15% of vaccinees, eight to 12 days after vaccination. Encephalitis has been reported following measles vaccination approximately at the rate of one case per million doses administered.

Storage

Exposure of the vaccine to high temperature and light before or after dilution may inactivate it. Long-term storage should preferably be at − 15°C to − 25°C. Short-term storage should be maintained at 0°C to + 8°C. The freeze-dried vaccine is stable for one to four weeks at room temperature. To avoid inactivating the vaccine with hot diluent, the diluent should be refrigerated at 0°C to + 8°C. After dilution, the vaccine must also be kept at these temperatures and used within eight hours.

PERTUSSIS (WHOOPING COUGH)

An acute disease involving the tracheo-bronchial tract. The disease, which is common among children, is caused by the bacterium *Bordetella pertussis*. Seasonal incidence does not have a consistent pattern in tropical climates. Complications include pneumonia, malnutrition and convulsions. The fatality rate is approximately 1 to 3% of cases in children under 1 year of age but may be higher in some areas. Mortality is especially high in infants under 6 months of age.

Transmission

Primarily by droplet spread from the respiratory tract of infected persons. Communicability is greatest during the early catarrhal stage, becoming negligible in about three weeks after the onset of the paroxysmal stage.

Incubation period

The incubation period is commonly seven days, varying from six to 12 days.

Clinical features

The catarrhal stage lasts one to two weeks and is characterized by coryza, sneezing, fever and a persistent cough. This is followed by the paroxysmal stage with repeated coughs that are succeeded by prolonged, sudden and inspiratory whoops. This period usually lasts from four to eight weeks. The whoop is rarely present in very young infants. Clinical diagnosis is therefore difficult at this age.

Prevention

There is no effective maternal antibody transmission. Natural disease generally confers immunity. Prevention is by appropriate immunization.

PERTUSSIS VACCINE

Pertussis vaccine consists of killed *Bordetella pertussis* bacteria and is usually available combined with tetanus and diphtheria toxoids adsorbed on aluminium salts.

Administration

The pertussis vaccine is generally administered together with diphtheria and tetanus toxoid as a triple vaccine known as DPT. The DPT vaccine may be administered simultaneously with measles and polio vaccines, following the recommended schedule and age for each vaccine.

Immunization schedule

Infants should have three doses prior to 12 months of age. The recommended age for the first dose is 6 weeks of age. The interval between doses is four weeks.

Efficacy

The vaccine is 60 to 90% effective after three doses. There is a marked fall-off in immunity four to seven years after vaccination.

Side-effects

Fever and local reactions of swelling, tenderness and redness follow a large proportion of pertussis vaccine administrations. In some cases, these are severe such as convulsions, screaming attacks, collapse, and very exceptionally brain damage. Newer vaccines with fewer side-effects are undergoing field trials.

Storage

The vaccine should not be frozen and must be maintained at 0°C to + 8°C.

TETANUS

An acute neurological disease caused by the toxin of the tetanus bacillus. It is found world-wide but is more common in agricultural regions. There is no definite seasonal pattern. It is epidemiologically important to distinguish neonatal tetanus in infants under 28 days from tetanus in all other age groups. The illness can lead to secondary infection of the respiratory tract, breathing difficulties due to chest muscle spasm, cerebral edema, phlebitis and embolism. Untreated neonatal tetanus may have a nearly 100% fatality rate. With appropriate treatment (demanding specialized care), the case fatality may be reduced to less than 50%.

Transmission

Infection comes from contact with soil or dust that have been contaminated with *Clostridium tetani* spores contained in animal excreta. Neonatal tetanus is usually acquired through the cutting of the umbilical cord with contaminated instruments or the use of contaminated dressings on the cord.

Non-neonatal tetanus is usually acquired through a wound infected by contaminated soil or dust. (Up to 30% of non-neonatal tetanus cases have unrecognized wound history.) Susceptibility is general but high-risk groups include neonates, postpartum women and agricultural workers through apparent or unnoticed puncture wounds.

Incubation period

The incubation period is commonly seven days, although it may range from four to 21 days.

Clinical features

The clinical features of neonatal tetanus are usually inability to breast-feed because of spasm of the jaw muscles, rigidity and convulsions due to sensory stimuli. Non-neonatal tetanus is characterized by rigidity, tenderness at the site of injury, and painful muscular spasms, primarily of the jaw and neck muscles, becoming progressively generalized with difficulty in swallowing and convulsions. Generalized muscular contractions usually occur three to four days from the onset of symptoms and last about seven to 10 days.

Prevention

Maternal antibodies provide temporary immunity for the first three months of life if the mother has been fully immunized. Natural infection does not provide immunity. Prevention is by appropriate tetanus toxoid immunization.

TETANUS VACCINE

Tetanus toxoid is prepared from *Clostridium tetani* toxin. The toxoid comes in three formulations: by itself (TT), with diphtheria toxoid (DT), or with pertussis and diphtheria (DPT).

Administration

The vaccine may be administered simultaneously with measles and polio vaccines, following the recommended schedule and age for each vaccine.

Immunization schedule

In countries where neonatal tetanus is common, it is recommended that all women of reproductive age as well as older schoolgirls be immunized with tetanus toxoid (TT). Pregnant women who have not previously been immunized should be immunized as early as possible during pregnancy. Two doses are given with a minimal interval of four weeks. A third dose in a subsequent pregnancy or the following year offers protection for newborns for at least five additional years, and a fourth dose for 10 years.

Infants should receive a basic course of three doses (DPT), in the first year of life, starting from 6 weeks of age and with a minimal interval between doses of four weeks. Booster doses may be given after the basic course.

Efficacy

The vaccine is highly effective and provides long-lasting protection.

Side-effects

Temporary swelling, tenderness and redness at the site of injection with fever lasting up to 24 hours may occur.

Storage

The vaccine should not be frozen and must be maintained at 0°C to + 8°C.

POLIOMYELITIS (INFANTILE PARALYSIS)

An acute viral infection caused by three antigenic types of poliovirus (I, II and III). Inapparent infections account for 95% of cases, non-paralytic infections for 5% and paralytic cases for 0.5%. The poliovirus type I is the most paralytogenic. In cases that develop paralytic manifestations, permanent, partial or total disability may result, with deaths occurring in 2 to 10% of cases. The majority of cases are observed in late infancy or early childhood. Poliomyelitis occurs all year round in tropical areas, but is more common in summer and early autumn in temperate zones.

Transmission

The entry point of the virus is oral. Where sanitation is poor, the virus is transmitted through fecal contamination of food or water. The risk of infection is greatest in crowded urban areas although it also exists in rural areas. Cases are most infectious seven to 10 days before and after the onset of symptoms.

Incubation period

The incubation period is generally seven to 12 days, but can range from three to possibly 21 days.

Clinical features

In non-paralytic infections there may be fever, sore throat, headache, nausea, diarrhoea, vomiting and stiffness of the neck and back lasting two to 10 days. In paralytic cases these symptoms are accompanied by a sudden onset of paralysis of the muscles of the limbs, face or of the chest/respiratory muscles, with maximal recovery within six months.

Prevention

Maternal antibodies provide temporary protection to infants for two to three months through passive immunity. Infection with the wild virus resulting in inapparent or clinically recognizable infection can provide immunity. Prevention is by appropriate immunization.

POLIOMYELITIS VACCINES

Both the inactivated poliovirus vaccine (IPV) and the live attenuated poliovirus vaccine (OPV) are in wide use. The latter is available as the trivalent oral poliomyelitis vaccine (TOPV) containing all three types of poliovirus.

Administration

OPV is given orally. The vaccine may be administered concurrently with DPT and measles vaccines, following the recommended schedule and age for each vaccine.

IPV is administered by injection. In infancy, the primary schedule is usually integrated with DPT immunization by use of a combined vaccine or concurrent injection.

Immunization schedule

OPV: infants should receive at least three doses at minimum intervals of four weeks within the first 9 months of age. In non-endemic areas, the first dose can be given from the age of 6 weeks with the first dose of DPT. In endemic areas, an extra dose should be given as soon as possible after birth.

IPV: the first dose is given at 3 months of age, the second and third doses at one to two month intervals, and the fourth dose 12 to 18 months after the third. Recently, a highly effective IPV (KPV (40–8–32)) has also been used in a two-dose schedule with a six-month interval between doses. The first dose is given at 3 months of age, because circulating maternal antibodies depress the response to killed virus vaccines.

Efficacy

OPV induces both circulating antibody and intestinal resistance, but poor serological response to OPV has been alleged in some developing countries.

IPV induces circulating antibody resistance and blocks pharyngeal excretion but does not prevent intestinal infection, though it may limit its duration.

Both IPV and OPV provide long-lasting immunity in up to 95% of the fully immunized.

Side-effects

OPV usually has no side-effects, but there is a very small risk (less than one case per 3 million doses administered) of vaccine-associated paralysis of that person or a contact.

Side-effects for IPV have not been documented.

Storage

Where possible OPV should be stored below −15°C, under which circumstances it has a shelf life of two years. It can be maintained for one year at 0°C to + 8°C. It can withstand only one day at + 37°C.

IPV should not be frozen. It should be maintained at 0°C to + 8°C. It has a shelf life of 12 to 18 months. It can withstand four weeks at + 37°C.

TUBERCULOSIS

A mycobacterial disease caused by the *Mycobacterium tuberculosis* primarily from humans, and *M. bovis* primarily from cattle. It is found world-wide, but incidence rates have fallen dramatically in industrialized countries. Morbidity rates increase with age and, among older persons, are higher in males than in females. They are usually higher in urban than in rural areas and decrease with improvements in the standard of living. Epidemics have been reported among people living in crowded conditions.

Transmission

Transmission is usually by exposure to bacilli in airborne droplets from the sputum of persons with infectious tuberculosis. The subsequent risk of progressive pulmonary or extrapulmonary tuberculosis is greatest within a year or two after infection, but it may persist for a lifetime as a latent infection. Cases are infectious for as long as the infectious tubercule bacilli are being discharged in the sputum. Cases that are untreated or inadequately treated remain sputum-positive for years. Extrapulmonary tuberculosis is generally not communicable. Where the disease is not controlled in cattle, infection with the bovine tubercule bacillus may occur as a result of drinking raw milk from infected cows.

Incubation period

The incubation period from the time of infection to a demonstrable primary lesion is about four to 12 weeks.

Clinical features

The initial infection usually goes unnoticed, with tuberculin sensitivity appearing within a few weeks. This may progress directly to pulmonary tuberculosis or spread to other parts of the body. The disease may also spread by the lymphatic route and produce pulmonary, miliary, meningeal or other extrapulmonary disease in children. A serious outcome to the initial infection is more frequent in infants, adolescents and young adults, particularly among malnourished or undernourished persons.

Prevention

Prevention is by appropriate immunization. Drug therapy has been shown to be effective in preventing the progression of latent infection.

TUBERCULOSIS VACCINE (BCG)

The vaccine is a freeze-dried preparation made from an attenuation of *Mycobacterium tuberculosis* (Bacillus Calmette-Guérin).

Administration

BCG is given intradermally and can be administered concurrently with other vaccines.

Immunization schedule

It is recommended that BCG be given routinely in developing countries as soon as possible after birth.

Efficacy

The protection conferred has varied markedly in different field trials, some providing evidence that protection may persist for as long as 20 years in high incidence situations. Currently, the efficacy of the vaccine is recognized for young children but there is controversy over the efficacy of the vaccine given at a later age, according to WHO trials in southern India.

Side-effects

A small red tender swelling appears at the site of immunization after about two weeks which might develop into an abscess or may cause a swelling of the lymph glands.

Storage

The vaccine is sensitive to sunlight and heat. It can be stored for one to two years if kept at or below + 8°C.

DIPHTHERIA

An acute bacterial disease caused by *Corynebacterium diphtheriae* of the tonsils, pharynx, nose, and occasionally of other mucous membranes and skin which may lead to muscular and sensory nerve paralysis and myocarditis. The case fatality rate is 5 to 25%.

Diphtheria affects the unimmunized in all age groups but primarily unimmunized children under 15 years of age. Formerly a prevalent disease, diphtheria has virtually disappeared in areas where effective immunization programmes have been carried out. It is not currently a serious problem in many tropical areas, where inapparent, cutaneous diphtheria infections are common, thus stimulating natural immunity to more serious forms of the disease. However, as living standards rise, and skin infections become infrequent, diphtheria could become a far more serious problem, and as an effective vaccine is available, most countries have incorporated it into their regular child immunization programmes.

Transmission

Transmission is through contact with a patient or carrier. Without adequate drug therapy the period of communicability can extend up to four weeks from the onset of the disease, otherwise it lasts for some 24 to 48 hours after the initiation of treatment.

Incubation period

The disease usually has an incubation period of two to five days, occasionally longer.

Clinical features

In pharyngeal cases, upper respiratory tract lesions occur, marked by patches of greyish membrane with a surrounding dull red inflammatory zone which may cause pharyngeal obstruction. Swelling and edema of the neck occur in severe cases. Laryngeal diphtheria is serious. There may also be neurological complications and myocarditis. The illness usually lasts between 10 and 21 days, depending on the promptness of drug therapy and the presence of complications.

Prevention

Maternal antibodies provide immunity for the first six months of life. Clinical attack or inapparent infection may provide immunity. Prevention is by appropriate immunization with diphtheria toxoid.

DIPHTHERIA VACCINE

The adsorbed diphtheria toxoid vaccine is used.

Administration

Diphtheria toxoid is generally administered in combination with tetanus toxoid, or additionally with pertussis vaccine. It may be administered simultaneously with measles and polio vaccines, following the recommended schedule and age for each vaccine.

Immunization schedule

Infants should receive three doses prior to 12 months of age. The recommended age for the first dose is 6 weeks and the minimal interval between doses is four weeks. A fourth dose may be given at 18 to 24 months of age and a fifth at school entry.

Efficacy

The vaccine is highly effective and provides long-lasting immunity after three doses.

Side-effects

In rare instances, swelling, tenderness and redness at the site of the injection together with fever is observed. Adverse reactions increase with age, and a highly purified toxoid (Td) of reduced concentration is therefore used after 6 years of age.

Storage

The vaccine must not be frozen, and must be maintained at 0°C to + 8°C.

YELLOW FEVER

An acute viral infectious disease of short duration and varying severity, which is transmitted by mosquitoes. Urban yellow fever outbreaks are still reported from Africa in areas contiguous to rain forest regions where jungle or sylvan yellow fever is enzootic. In Africa, the area of incidence lies between the latitudes of 15° N and 10° S. Sylvan yellow fever is enzootic with a few hundred cases each year in the northern region of South America and the Amazon basin. No cases have ever been reported in Asia, although the mosquito vector is found. The case fatality rate in endemic regions is under 5%, but may reach 50% among nonindigenous groups or in epidemics.

Transmission

Aedes aegypti mosquitoes transmit yellow fever in urban and certain rural areas, and other *Aedes* mosquitoes transmit the infection from monkey to man in Africa. In the forests of South America transmission is by *Haemagogus* mosquitoes. The blood of patients is infective for mosquitoes before the onset of fever and for the first three to five days of illness. It is highly communicable where many susceptible persons and abundant vector mosquitoes coexist. Sylvan yellow fever of tropical America occurs predominantly among adult males of 20 to 40 years old who are exposed in the forest.

Incubation period

The incubation period is three to six days.

Clinical features

The mildest cases are difficult to diagnose. Typical attacks have a sudden onset with fever, headache, backache, prostration, nausea and vomiting. As the disease progresses, the pulse slows and weakens and albuminuria and anuria may occur. Hemorrhages and jaundice follow the period of fever and vomiting.

Prevention

Infants born to immune mothers may retain passive immunity for up to six months. Recovery from yellow fever is followed by lasting immunity. Prevention is by appropriate immunization.

YELLOW FEVER VACCINE

The vaccine contains the viable attenuated yellow fever 17D strain virus.

Administration

The vaccine is administered by subcutaneous injection or by jet injector.

Immunization schedule

The vaccine is given in one dose which is administered from the age of 6 months in endemic areas.

Efficacy

Following immunization, antibodies may persist for at least 30 to 35 years, probably much longer, though immunization or revaccination within 10 years is still required by the International Health Regulations for travel to and from endemic areas.

Side-effects

In 2 to 4% of cases there is fever with headache, occasionally accompanied by joint and muscular pains.

Storage

Short-term storage should be maintained at 0°C to + 8°C. Long-term storage should preferably be at − 15°C to − 25°C.

MENINGOCOCCAL MENINGITIS

An acute bacterial disease caused by the meningococcus *Neisseria meningitidis* of types A, B and C. Additional serogroups have been recognized recently. Organisms belonging to some of these serogroups may be less virulent, but fatal infections and secondary cases have occurred with all. Formerly, the case fatality rate exceeded 50% but with early diagnosis, modern therapy and other supportive measures, it is now less than 10%. The disease occurs in both temperate and tropical climates. Major epidemics periodically occur in hot dry zones particularly in the Sahel. Group A and C organisms have been mainly responsible for these outbreaks. The disease occurs primarily in children and young adults (males more than females).

Transmission

Transmission is through direct contact, including droplets and discharges from the nose and throat of an infected person. Cases are infectious until meningococci are no longer present in nose and mouth discharges. If the organisms are sensitive to sulfonamides, the meningococci usually disappear from the nasopharynx within 24 hours after the institution of treatment.

Incubation period

The incubation period varies from two to 10 days, but is commonly between three and four days.

Clinical features

The illness has a sudden onset with fever, intense headache, nausea and often vomiting, stiff neck and at times a rash. Delirium and coma often appear. In severe cases there is a sudden onset of prostration, shock and ecchymoses. The disease may be asymptomatic or restricted to the nasopharynx, or meningeal.

Prevention

Group-specific immunity of unknown duration follows even subclinical infections. Prevention is by appropriate immunization.

MENINGOCOCCAL MENINGITIS VACCINE

Freeze-dried meningococcal polysacharide vaccines containing Groups A and C are available in monovalent or bivalent form. No vaccine effective against Group B meningococci is currently available. The vaccines are used in situations where epidemics occur, and not routinely in immunization programmes.

Administration

The vaccine is given by subcutaneous injection or by jet injector.

Immunization schedule

Monovalent and bivalent A and C vaccines are effective in adults and older children. Serogroup C vaccines are poorly immunogenic in children under 2 years of age. Serogroup A vaccine is effective in younger children, however, for those 3 months to 2 years old, two doses are usually given three months apart instead of the single doses given to those over 2 years of age.

Efficacy

The vaccine gives 90% protection in one to two weeks which lasts for two to three years.

Side-effects

These are mild and infrequent in older children and adults. Transient local erythema at the injection site and mild irritability or lethargy for one to two days are infrequent.

Storage

Group A and C stabilized vaccines can be stored between + 2°C and + 8°C for two years. The reconstituted vaccine should be used on the same day.

Participants in the revision of these guidelines:
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Stan Foster (for measles)

The final version of the guidelines on the six vaccine-preventable diseases included in EPI was reviewed by WHO/EPI and on meningitis and yellow fever by the Communicable Diseases and Immunization Unit of the International Children's Centre.

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The smallpox eradication campaign

Lessons learned

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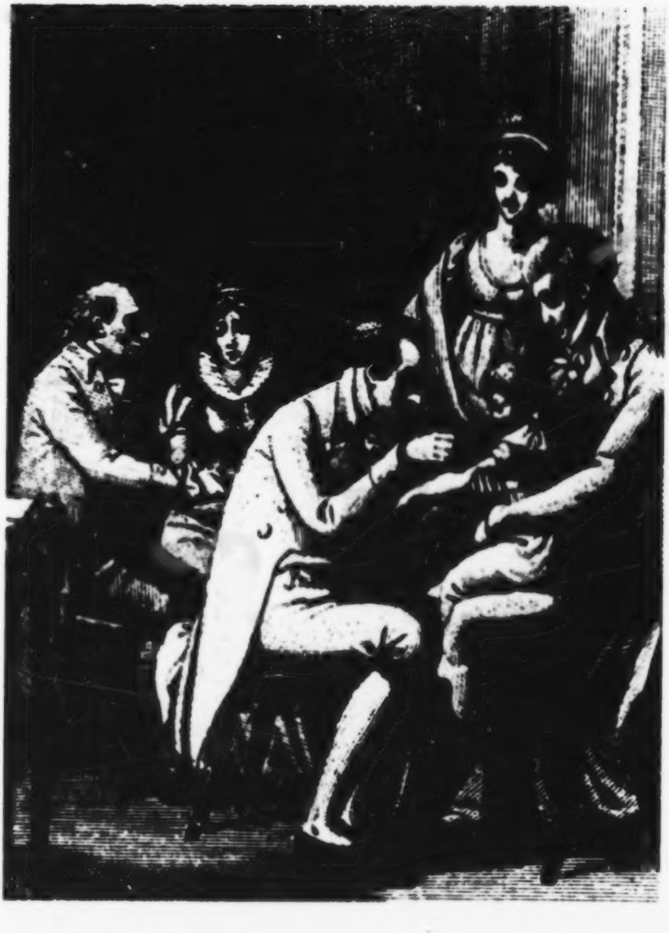

Jenner vaccinating a family
Engraving by J. F. Bolt, 1807
Staatliches Museum Berlin Kupferstichtkabinett
WHO/16659

Focus on two books

The spread of Jenner's vaccine

Social mobilization in the early nineteenth century

Several books have been devoted in the past to the history of smallpox, for instance the classic Smallpox *by C. W. Dixon, published in 1962 by J. and A. Churchill Ltd., London, which endeavours to present both the clinical and public health aspects of the disease.*

More recently, two very important books have been written on the history of smallpox, one in the United States, by Donald R. Hopkins, assistant surgeon general of the United States and deputy director of the Centers for Disease Control, Atlanta, entitled Princes and peasants, smallpox in history, *published in 1983, the other one in France, by Yves-Marie Bercé, professor of modern history at the University of Reims, entitled* Le chaudron et la lancette, croyances populaires et médecine préventive (1798-1830), *published in 1984.*

Among the many topics which these two recent books address, a most important question for today's strategies is extensively documented: how did the Jenner vaccine spread over the world in 10 years?

Some of the significant answers which the works of Donald R. Hopkins and Yves-Marie Bercé provide are excerpted and adapted below.

For centuries, perhaps millenia, smallpox killed or disfigured millions of human beings. It did not discriminate between kings and commoners, princes and paupers. The dreaded disease suddenly deprived countries of their rulers, decimated armies, destroyed the fabric of city life, ravaged the countryside, and laid low whole populations that had had no previous contact with smallpox.[1]

The world was ready for Edward Jenner's discovery, when he announced in London in 1798 that he had successfully experimented with a cowpox vaccine. In less than 10 years, his vaccine was in wide use throughout Europe, the Middle East, the Americas, India, China and Australia.[1]

The extraordinary speed with which Jenner's discovery was welcomed and exploited everywhere was all the more remarkable when one remembers how slow and difficult communications were at the beginning of the nineteenth century. In addition, Europe was involved in the Napoleonic wars: sea and land blockades, armies everywhere on the march might have been expected to halt, or at least slow down, the spread of Jenner's vaccine. But nothing seemed to stand in its way.

Jenner's findings were first published in the form of a book, *An inquiry into the causes and effects of Variolae Vaccinae, a disease, discovered in some of the Western counties of England, particularly Gloucestershire, and known by the name of cow pox*, which appeared in June 1798.[1] Three months later, excerpts had been reproduced in the medical press and in particular in a widely read periodical, *Bibliothèque britannique*, published in Geneva.[2] By March 1801, when Jenner published his next work, *The origin of vaccine inoculation*, in which he stated that 100,000 people had been vaccinated in England alone, his first findings had already been translated into French, Spanish, Dutch, German, and Italian.[1]

Less than a year after the publication of Jenner's findings, a first shipment of cowpox vaccine travelled by post and the diplomatic pouch from England via the port of Hamburg to Vienna. There, an Edinburgh-educated physician from Geneva, Jean De Carro, vaccinated his own two small sons. Several months later he exposed them to smallpox but, thanks to the cowpox vaccine, they showed no effects whatsoever. De Carro informed Jenner and *Bibliothèque britannique* of his success.[2]

That same year (1799) an English doctor, George Pearson, sent cowpox vaccine to more than 100 physicians on the Continent.

Meanwhile in France, doctors had not succeeded with their first vaccinations, so they asked an "enemy" physician, William Woodville, to come over from England. Since France and England were at war, a special passport was issued to him and he crossed the Channel to Boulogne where, in June 1800, he performed successful vaccinations. He went on to Paris in July to do the same.

Napoleon was so impressed by Jenner's discovery that he permitted some English travellers to carry a simple certificate signed by Jenner, who personally vouched for the bearer, instead of a passport.[2]

If smallpox recognized no frontiers, neither did Jenner's fame and vaccine. While there was inevitably some objection to vaccination from conservatives on scientific, religious and social grounds from the very beginning, significant opposition did not occur until the late nineteenth and early twentieth centuries, when the reduction in smallpox mortality rates due to vaccination led to an upsurge of anti-vaccinationist protest.[1]

By 1800, the vaccine was being used in North America, by 1801 in Berlin and Moscow. De Carro sent vaccine to Baghdad whence it was forwarded to India in 1802. A no less enthusiastic vaccinator, Francisco Xavier Balmis, set sail in 1803 from Spain for the New World, where *Conquistadores* had introduced smallpox to Spanish America some 300 years earlier. By 1806, Balmis was back in Spain, having circled the globe and taken Jenner's cowpox to the Philippines and China.[1]

The enthusiasm of doctors, and the French Revolution, which led millions of Europeans to be receptive to new ideas, played an enormous role in the rapid adoption of Jenner's vaccine. But other classes of society were no less essential to its success.[2]

The influential ruling families were prominent among the victims of smallpox, which killed a queen of England, an Austrian emperor, a king of Spain, a tsar of Russia, a queen of Sweden, and a king of France in the 80 years before 1775.[1]

Many threatened royal houses exerted a powerful influence in helping to persuade their subjects to accept inoculation. The sovereign provided a model, either in his own person or in that of his own children. If a prince judged it wise and healthful for himself to accept an act recommended by men of science and agreed to submit his own body to it, should not his subjects accept it with all the more spontaneity and confidence?

Examples of monarchs and nobles leading the way with Jenner's vaccine abound. The dukes of York and Clarence, brothers of the king of England, demonstrated their belief in the vaccine in 1802, by vaccinating their own children and servants. The emperor of Austria had his children vaccinated the same year, and he was followed within a few years by the kings of Denmark, Sweden and Prussia, and the grand duke of Tuscany.[2]

Ferdinand I, king of the Two Sicilies, personally greeted the English vaccinator, Joseph Marshall, in the port of Palermo in 1801. Later, in Naples, he had the court surgeon take pus from the baby prince and use it to vaccinate abandoned children.[2] The Sicilian people adopted the vaccine as a miraculous gift. Tubes of the vaccine were carried ceremoniously to the altar of the cathedral of Palermo. On public vaccination mornings it was not uncommon to see processions of men, women and children led through the streets to the hospital by a priest holding a cross.[1]

Particularly effective was the highly-publicized vaccination of Napoleon's only child, the king of Rome. It took place at the height of Napoleon's power and influence. The prefect in Parma assembled some 600 religious and military leaders, judges and university professors and, pretending to have just received a dispatch, cried to the group: "At this very moment I have just learned that His Majesty, the King of Rome, has been successfully vaccinated". This imperial example was brought to the attention of local committees who were urged to do "everything in their power to spread a discovery which must be looked upon as a gift of Heaven".[2]

One of the most famous examples of royal sponsorship involved the dowager empress of Russia, Maria Feodorovna. Importing the vaccine from Breslau, Prussia, in 1801, she had an orphan successfully vaccinated. She had him renamed "Vaccinoff", educated at state expense and granted a pension for life. This paved the way for the adoption of vaccination in Russia.[1, 2]

Not all countries in the early 1800s were monarchies with a royalty and an aristocracy willing to advocate vaccination to their subjects. A notable exception was the young American Republic. One of its first presidents, Thomas Jefferson, played an important role in promoting acceptance of vaccination among his people. He set an example by having all the members of his household at Monticello vaccinated against smallpox. Jefferson also designed a special vessel to protect the vaccine from hot weather and sought to promote vaccination among the Indians. He asked two explorers of the Louisiana Territory, Meriwether Lewis and William Clark, to "carry with you some matter of the kinepox (cowpox), inform those of them with whom you may be of its efficiency as a preservative from the smallpox; and instruct and encourage them in the use of it".[1]

The role of the Church was likewise extremely important in mobilizing public opinion in favour of smallpox vaccination.

The very first instance of ecclesiastical collaboration with a vaccinator is recounted by De Carro about a village priest in Brunn am Gebirge, just outside Vienna, in January 1801. The priest was impressed by De Carro's successful vaccination of four children of a local personality. After obtaining German-language texts on Jenner's vaccine, he described the history of the discovery to his parishioners one Sunday in church. From his pulpit he sang the praises of vaccination and reassured them that protecting themselves against a disease was in no way to go against the views of the Almighty. Such was the effect of his sermon on the peasants that De Carro found 35 children to be vaccinated on his first visit to Brunn.[2]

The vocabulary of the clergy, the medical corps and civil authorities was virtually interchangeable. Smallpox was called "the massacre of the innocents", Jenner's vaccine "a miraculous discovery, a divine branch of medicine, a heavenly grace". Vaccination was likened to baptism.[2]

The most frequent form of ecclesiastical participation in the spread of vaccination consisted of transforming the priest's house, or the rectory, into a vaccination clinic. There, mothers and children of the parish gathered to wait for the itinerant vaccinator. Upon his or her arrival the church bells rang.[2]

Nor, of course, were the highest ranks of the Church neglected. Vaccination was successfully demonstrated in Rome in 1801, and more widely used, starting in 1802, on orders from the Papal Secretary of State, Cardinal Consalvi. In the midst of a smallpox epidemic in Rome in 1814, the Pope endorsed vaccination, describing it as a precious discovery which ought to be a new motive for human gratitude to Omnipotence.[1, 2]

Protestant churchmen were equally active in propagating vaccination. Some ministers in England, Switzerland and Germany not only advocated vaccination, but practised it.[2]

Military leaders also understood the importance of vaccination shortly after Jenner's discovery. Four years later, in 1802, the duke of York ordered the British army to be vaccinated. Napoleon issued similar orders for his troops three years later. The British Admiralty was one of the first advocates of massive vaccination of sailors, their children, and all retired seamen.[1]

The support of kings, doctors and priests was essential, but in the last analysis vaccination would not have become general practice if the children's mothers had not been convinced of its necessity. Every speech, every exhortation by a medical or political authority inevitably contained an appeal to mothers.[2]

There were many ways of reaching mothers, and there were a number of social groups in a position to be effective. Doctors' wives, for example, often accompanied their husbands on their vaccinating tours, talking to mothers. These women, and the wives of other well-known people, often influenced less educated and poorer mothers by publicly having themselves or their own children vaccinated.[1]

Perhaps the most effective women were the midwives. They enjoyed the confidence of mothers, and many successfully convinced mothers of the benefits of vaccination.[2]

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[1] **Donald R. HOPKINS, *Princes and peasants, smallpox in history,* The University of Chicago Press, Chicago, 1983, 380 p.**

[2] **Yves-Marie BERCÉ, *Le chaudron et la lancette, croyances populaires et médecine préventive (1798-1830),* Presses de la Renaissance, Paris, 1984, 336 p.**

History

The warm chain

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While one series of events carried smallpox vaccination on an eastward odyssey, a second path led westward from Spain to Spanish America, to the Philippines, and to China. The successful circumnavigation of the globe with vaccine in the era before refrigeration, freeze-dried vaccines, and jet aircraft, rested upon a singular medium—little boys.

Early vaccine preservation techniques were not always reliable on the long voyages undertaken to spread smallpox vaccine throughout the world. For this reason, the "arm-to-arm" method was regularly used to keep the vaccine potent. Pus would be removed from the inoculation site of a vaccinated subject, and used for further vaccinations while still potent.

Francisco Xavier Balmis (1753-1819), a Spanish physician, sailed around the world in three years, establishing vaccination boards in South America, the Philippines, and China. He led the *Real Expedición Marítima de la Vacuna*, sponsored by the Bourbon king Charles IV; its success derived from arm-to-arm passage of the virus using orphan boys on the long voyages across the Atlantic and Pacific oceans. Venezuela was the first country to which Balmis introduced vaccine. He divided the expedition with his deputy, Salvany, who was to lead one group through the Spanish colonies in the Vice-Royalty of Peru; Balmis would lead the other group across the Vice-Royalty of

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Excerpted from The odyssey of smallpox vaccination, *Bulletin of the History of Medicine*, vol. 55, no. 1, The Johns Hopkins University Press, 1981, pp. 17-33.

New Spain to the far-distant colony in the Philippines. The establishment of central boards to regulate vaccination became one of Balmis's principal preoccupations, and the board he created in Venezuela served as the model for those that he and Salvany were to establish later.

Balmis sailed for Havana from La Guaira on 8 May 1804 while Salvany led his team to Bogotá. Balmis's singular success in Caracas, and Salvany's in Bogotá, where Salvany also created a Central Vaccination Board, were attributable in large measure to the total support they received from church and civil authorities. The message from the Roman Catholic pulpit to the people was of special importance in creating a proper climate for the vaccination programmes.

While Charles IV was eager to provide vaccinations in New Spain, the Portuguese throne held a comparable interest in its prize colony, Brazil. In 1804, Felisberto Caldería Brant Pontes sent a group of slave children from Bahia to Lisbon so that arm-to-arm transfer could be made on the return voyage. His effort was successful and 1,335 persons had been vaccinated in Bahia by 1 June 1805. It may have been the same slave ship sailing to Bahia that brought the vaccine to Montevideo, Uruguay, in the same year.

In a decree of 3 September 1803, Charles IV directed that the Balmis expedition should continue to the Philippines.

The advancement of health in the Philippines was a major commitment of the Spaniards. A military hospital was established in Cebu in 1565, and by the end of the sixteenth century, hospitals for the natives were scattered throughout the archipelago. At the beginning of the seventeenth century, the Philippines were judged to be ahead of all other colonies of European powers in the care of the sick.

The Philippine vaccination expedition, headed by Balmis, sailed from Acapulco on *The Magellanes* on 8 February 1805, with the rectoress of the Santiago orphanage in Spain, four nurses, and 26 Mexican boys who were to be used for arm-to-arm vaccination. *The Magellanes*, one of the two most famous of the later galleons, was also jammed with soldiers and representatives of religious orders. Round-the-clock efforts to prevent the accidental transfer of smallpox virus from one boy to another were only partly successful. Fortunately the winds were highly favourable, and on 15 April, one day after the galleon anchored in Manila Bay, Balmis introduced vaccination in that city.

On 16 May, Balmis proposed the establishment of a central board of vaccination in Manila, under the supervision of the archbishop, for the production, conservation, and distribution of lymph; he also opened a centre to which all residents of the city could come to be inoculated. The calves of the native water buffalo, *caraboa*, were used to produce the vaccine, which was shipped to the provinces in glycerine protected by glass slides sealed in paraffin in capillary tubes or in small bottles.

Three months after his arrival in Manila, with three Filipino lads as carriers, Balmis sailed across the China Sea to Macao, where he landed during a typhoon on 10 September 1805.

A singular set of barriers faced the early physician-vaccinators in China. One was the refusal of Chinese mothers to permit the use of their children for arm-to-arm transfers on the grounds that it would weaken the donor child. Another was the Chinese prejudice against vaccinations in the summer and autumn, which made the preservation of the lymph unpredictable. On at least two occasions it therefore became necessary to reintroduce lymph from Manila. The usual vaccination procedure required the doctor to take a freshly vaccinated boy to the home of the family to be inoculated; the child, in turn, received a modest fee from the family.

The British established a vaccination centre in Canton on 2 December 1805 with lymph from Balmis's expedition. On the voyage back to Spain, Balmis introduced vaccination on the British island of Saint Helena.

In the almost 39 months since Balmis and the royal expedition had sailed from La Coruña, he had introduced vaccination in South America, the Philippines, and Saint Helena; he had stimulated the establishment of central vaccination boards to ensure a continuing supply of lymph; and had organized vaccination programmes. Balmis's success was attributable to his intelligence and to his missionary fervour in propagating vaccination. Through the zeal of two physician-entrepreneurs, Jean De Carro and Francisco Xavier Balmis, one decade after its discovery, vaccination had girdled the world on Asian and New World voyages from Europe.

Lessons learned

Beyond smallpox eradication

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This paper highlights two important, under-recognized lessons of the Smallpox Eradication Programme (SEP).

The first lesson is that the discipline and enthusiasm of that vertical campaign could be applied to an attack on several high priority diseases or conditions simultaneously, to great advantage.

The second lesson is that eradication of selected diseases remains a uniquely useful tool for advancing the public's health.

The last case of naturally-occurring smallpox was reported in Somalia, East Africa, in October 1977, signalling the triumphant conclusion of one of this century's greatest accomplishments in public health. As the first disease of humans to be eradicated—though unsuccessful eradication campaigns had earlier been declared against malaria and yaws—smallpox and the Smallpox Eradication Programme (SEP) have been scrutinized for "lessons" relevant to public health practice and policy. [1, 2, 3] The purpose of this paper is to draw attention to two lessons which, I believe, are among the most important to be drawn from the SEP, but which have received little or no attention up to now. The relative neglect of these two lessons is all the more curious since they would seem to be particularly

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useful in achieving "Health for all by the year 2000", the paramount global goal which was agreed to one year after smallpox was eradicated.

Discipline, enthusiasm, and measurable targets

The first neglected lesson concerns the discipline and enthusiasm which epitomized the SEP, particularly in its later stages. While it aimed from the beginning at a measurable goal, namely, eradication of smallpox, in its earliest stages the SEP used a mass vaccination strategy, and progress was monitored mainly by numbers or proportions of populations vaccinated. Towards the end of the programme, however, operations had become much more efficient because of the change in strategy from mass vaccination to selective containment.[4] These operations during the latter stages were also more effective, I am convinced, because the critical activities required were more clearly specified and easily monitored. Operational objectives such as detection of outbreaks and containment of cases within specified periods after their onset and discovery, respectively translated overall strategy and tactics into measurable targets for everyone at all levels of the programme. This made the relevance and contribution of their own individual efforts readily apparent to virtually every worker in the programme. That clarity of vision and understanding of individual contribution, made possible by the specific, measurable operational objectives through which progress or setbacks were manifest within days or a few weeks, are what unleashed the unusual dedication, impatience with unsatisfactory performance, and passion which was evident to all who witnessed SEP operations, especially after about 1970.

Anyone who has seen the effect of such an incentive knows its power. It can lock the attention of health workers and their supervisors onto outcomes, i.e., reductions in morbidity and mortality or other improvements in health, which is where it should be. Process-related activities, such as training of health workers, numbers of persons vaccinated, provision of supplies, etc., thus become the more flexible means to the desired health-outcome-ends, subject to change or adjustment as necessary, rather than being perceived as rigid ends in themselves.

A focused approach to integrated programming

If the malaria and smallpox eradication programmes represent what might be called prototypic "first generation" vertical programmes, and WHO's Expanded Programme on Immunization (EPI), which seeks to assure immunization against six important diseases of childhood, represents a "second generation" programme (which addresses several priority problems through a single type of intervention), there is need to apply the discipline and enthusiasm of the SEP to "third generation" programmes by attacking several high-priority diseases simultaneously, using different interventions. Like the SEP, this approach would use specific, measurable, operational targets, and impact on the target diseases would be the ultimate measure of success or failure. Such an effort would retain the discipline that is characteristic of a vertical programme, but unlike first and second generation vertical programmes, it would use that discipline to focus the energy of the health care system on a group of high-priority problems which require different modes of intervention, simultaneously. It would also, however, avoid the more passive, unfocused approach typical of those "horizontal", or integrated disease control programmes that purport to address all, or nearly all, health problems but lack clear priorities or disease-related objectives.

In many tropical developing countries, any list of highest-priority communicable diseases, for which practical effective interventions already exist, would be likely to include the EPI diseases, especially measles, tetanus, polio and tuberculosis; diarrhoeal diseases; malaria; and possibly schistosomiasis. Appropriate interventions would include immunization, oral rehydration therapy, and treatment or presumptive treatment of infectious or most vulnerable patients as a first priority. This approach is similar in some ways to the "selective primary health care" concept, but goes further. "Selective primary health care", as described by Walsh and Warren,[5] deals mainly with the need to select a limited number of diseases for attack, and how they should be chosen. Applying the discipline of the SEP would mean establishing the list of preventable diseases/problems which are of high priority in the first place; but then also deciding on strategy, tactics, specific objectives and targets for each problem; and spelling out clearly the day-to-day implications of those decisions for each member of the public health and health care systems. If control of tuberculosis, for example, is a national priority, what exactly are village health workers, rural health inspectors, and district medical officers, for example, expected to do about a patient with a history of cough and bloody sputum for four weeks? And what supplies, equipment and training do they need in order to be able to do it? Similarly, one would specify the other high-priority actions which the same health workers should be taking to prevent and treat patients who have, or are exposed to, other priority diseases or conditions (e.g., inadequate spacing of children).[6] For each health worker, the sum of such actions would constitute an explicit, realistic description of what they were expected to do in the struggle against the priority diseases. Depending on the government's priorities, this might occupy all, most, or only a fraction of their total time.

In working out such implications for each priority problem or disease, at each level of the public health system—including the corresponding implications for logistics, laboratory services, training and evaluation—much of the energy of that system could be focused by design on those diseases or conditions which have been declared to be priorities, rather than having priorities determined by default, depending on the complainants who happen to turn up, the whims of individual health workers, or what supplies happen to be available, etc. The difference between the latter and former approaches is the difference between sunlight simply imparting warmth to a broad area, and what it can do when concentrated by a magnifying glass. As B. B. Waddy observed 30 years ago: "The forces available to combat rural ill-health are enthusiastic but small. They should not be dissipated on too many unattainable objectives, but concentrated ruthlessly on those that can be achieved, and which careful forethought considers will do the most good."[7] Unfortunately, in rejecting the singularity of vertical programmes, the value of focusing on outcomes rather than on process alone, and of establishing appropriate measurable targets which can reflect after a relatively short period the efforts of health workers, are often neglected as well.

Eradication, both feasible and useful

The second neglected lesson is that eradication is still a valid, useful, appropriate public health tool in some instances. The Fogarty International Center of the United States Public Health Service's National Institutes of Health has sponsored a series of symposia over the past four years to examine the potential for the eradication of measles, polio, and yaws.[8] The Pan American Health Organization recently announced a major new effort to eliminate the transmission of polio in the Americas by 1990, and the Regional Office for Europe of WHO has announced goals calling for elimination of several immunizable childhood diseases, including measles and polio, from that region by the year 2000.[9] However, eradication campaigns are now generally out of favour.[10] After reviewing previous campaigns, and considering several infectious diseases, Yekutiel concluded in 1980 that "there are no suitable candidates for eradication in the immediate future".[1] This hesitancy to follow up the success of the SEP with an aggressive attack on another disease seems to be due to one or more of three factors.

The first factor, so often cited by Yekutiel and others, may be called "technical reasons". By an almost perverse rationalization of the SEP example, smallpox has become a kind of standard for some critics by which all other candidate diseases are not merely judged, but to which they are held. To the extent that any other disease differs from smallpox, it is sometimes held to be that much unsuitable for eradication. That clearly is not logical. Imagine the comparable conclusion if malaria (or yaws) had been eradicated before smallpox! Smallpox and the SEP should be used as models, not moulds.

Another important factor is the fear of "failure", a pernicious legacy of the Malaria Eradication Programme (MEP) which, although it accomplished much, failed in its overall objective. Even the subsequent success of the SEP has not been enough to overcome that fear. Not all of the fear of failure and its consequences can be blamed on the MEP, however. For some cautious souls, eradication of any disease will not be thought possible until it has been achieved, if then. Targets for eradication must be chosen carefully, but the whole concept need not be abandoned altogether.

A third factor is concern that another eradication campaign, even if successful, would distract attention from a more important goal, the development of broad-based primary health care services. That does not have to happen. On the contrary, eradication efforts could be used to mobilize more support for developing primary health care services in poorer countries. By introducing an excitement, zeal, and in some cases, a self-interest angle for more developed countries, eradication could provide motivation and mobilization for development of primary health care services which other approaches alone cannot match. Moreover, public health workers in developing countries would benefit from other visible victories, even as they continue their long-term struggles against more intractable problems. (As mentioned above, even some of those more intractable problems can be broken into more digestible pieces.)

Eradication within the context of primary health care

There are at least three diseases, the eradication of which by 1995 could be used to strengthen the development of primary health care, in my opinion: dracunculiasis, measles, and yaws. Dracunculiasis (guinea worm disease) is potentially the most visible, easily measured, most directly-related-to-development target of the water supply and sanitation component of primary health care.[11] India has shown how a dracunculiasis eradication effort can be organized in the context of primary health care.[12] Eradication of measles would give more advanced countries a strong reason (self-interest) besides humanitarianism to support rapid universal implementation of the EPI programme, which would be the appropriate way to pursue measles eradication, unlike the solitary attack on smallpox.[13] Moreover, rapid implementation of the EPI programme is very much in the interest of developing countries as well, for several reasons, including the foresight to avoid complicating the epidemiology of measles by gradual, partial immunization of target populations.[14] Yaws eradication or control could be used as an indicator of the extension of the most basic primary health care services to populations where that disease occurs, which almost by definition are lacking such services.[15]

Thus, it should be possible to focus on each of these three diseases, and eradicate them, by strengthening appropriate components of primary health care, rather than by a single-disease approach as in the past. Interruption of transmission of the disease, in turn, would provide another sensitive measure of the efficacy of certain primary health care services. Without such measures, there is a risk that provision of primary health care will be seen and pursued as an end in itself, independently of its impact on morbidity and mortality, just as tertiary health care has been.

While there are many lessons to be learned from the SEP, I believe these two are among the most important of them.

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Lessons learned

Smallpox eradication

Selected management issues

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The eradication of smallpox was dependent on the attainment of a high level of herd immunity during the consolidation and maintenance phases of the eradication programme, after mass vaccination efforts had reduced the incidence of the disease to a few endemic areas in the world.[1] *Immunity was possible through the immunization of susceptible populations. Attainment of effective immunization in both large and small countries, with both concentrated and dispersed population settlement patterns, was dependent not only on improved vaccination technology, notably the widespread availability of heat-stable freeze-dried vaccine and the use of the bifurcated needle, but also on the way eradication programmes were designed and implemented.*

This paper will outline important components of the smallpox eradication programme, particularly, information management, personnel management, and material resources management. Although they were critical to the eventual success of the programme, there has been little consolidated effort to review these management strategies. The paper, to a large extent, concentrates on the eradication programmes of Bangladesh, India and West Africa, given that these come to the forefront in terms of reviewing management strategies in the internationally available literature.

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Traditional beliefs and interventions

Smallpox has been recorded extensively in historical accounts, having intervened in such episodes as wars and having caused the sudden death of world leaders.[2] In primitive societies, smallpox was generally attributed to the acts of gods and supernatural phenomena. In Mali, for example, the Songhai and Dogon tribes attributed smallpox to genii and sorcerers;[3] remedies were numerous and revolved around the intimate relationship between sorcerer and patient, but they were likely to include the taking of baths and often the subsequent ingestion of bathwater by the patient and sometimes by family members. The Bambara tribe of Mali viewed smallpox as coming from the wind.[3] The Nigerian god of smallpox, Shopanna, was regarded as being as destructive as the noon-day sun.[4] In southern India, Periammai was the goddess of smallpox, enjoying an annual festival as an act of reverence, in the hope that she would be lenient during the upcoming year.[5] In many primitive situations, the smallpox-afflicted person was believed to have angered the goddess or genii and was isolated so as not to pass this anger to others; this was practised, for example, in parts of India,[5] also in Togo.[4] Traditional intervention was, therefore, both counterproductive (baths) and productive (isolation) in limiting the spread of smallpox.

Another centuries old tradition was the practice of variolation, actually inoculating persons with smallpox material, generally of the mild variola minor strain, in order to protect against the life-threatening variola major.[2, 6, 7] In China, this practice dated back at least to the sixteenth century.[8] Although variolation usually caused clinical smallpox, data from one village in Mali[7] showed that whilst variolated people had a higher attack rate of smallpox, the case-fatality rate was nil compared to 12% in those left unvariolated.

The beginning of the eradication process

The beginning of eradication can be traced to Jenner's famous experiment in 1796, which eventually resulted in the introduction of mass vaccine production in 1842.[2, 6]

Smallpox had a very self-evident position in history, playing a major role in inhibiting population growth until vaccination was introduced.[9] Resistance to the introduction of vaccination was varied; in the more primitive societies, especially where sorcerers and fetisheurs relied to an extent on smallpox for their existence,[10] unfavourable attitudes persisted until vaccination proved to be a stronger force.[5]

Eight biological features have been cited as having facilitated the smallpox eradication process:[11]

- the severity of the disease with easily recognizable manifestations;
- the fact that subclinical smallpox did not appear in unvaccinated persons;
- the fact that infectivity occurred at the onset of visible manifestations;
- the non-recurrence of the disease;
- the existence of only one serotype of the variola virus which enabled a vaccine to be produced;
- the stability of the vaccine;
- seasonal fluctuations in the incidence with periods of low case notification levels;
- the absence of animal reservoirs—their existence would have made complete eradication impossible.

The epidemiology of smallpox was more clearly understood during the intensive phases of eradication.[6, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21] Simple pock-mark surveys were a determinate method of calculating incidence and presumed death rates. The relatively low transmission rate of the disease meant that close contact was required for effective propagation.[6, 17, 20] Although this eventually proved to be the epidemiological key to success, making containment feasible, selective epidemiological measures were only carried out to contain outbreaks in non-endemic areas, capitalizing on the slow spread of infection. Endemic areas had concentrated on costly and ultimately inefficient mass immunization campaigns in an attempt to reduce the overall population susceptibility to the disease.

The first call to action for the eradication of smallpox in a concentrated effort came in 1958; the ease of international travel, especially due to faster and more economical air travel had increased the chance of smallpox invading non-endemic areas. Historically, smallpox epidemics had occurred during periods of mass population movement.[2, 22] As late as 1966, 71 cases were reported after smallpox importation into the United Kingdom.[23] While some progress had been made earlier, the consolidated commitment to eradicate smallpox came in 1966,[9] at a time when the world was spending US$ 1 billion per year on smallpox control.[24] The World Health Assembly adopted a 10-year plan for the eradication of smallpox, committing US$ 2.5 million from its regular budget for this purpose and establishing a central Smallpox Unit in Geneva.[6, 9, 22]

Two technical breakthroughs

Adequate vaccine supplies, both in terms of quantity and of quality, were unavailable in 1966.[25] A rapid acceleration in vaccine production eventually resulted in the production, in 62 countries, of a stable freeze-dried vaccine, which was a major technical contribution to the eradication programme;[6] this was facilitated by donations of equipment, mainly by WHO and UNICEF.[26] Another technical breakthrough was the introduction of the bifurcated needle, which studies proved to be simpler to use, more effective and more cost-efficient than the rotary lancet used earlier.[6, 12, 27]

Alternative eradication strategies

In 1967, smallpox was endemic in 33 countries and there were thought to be 10 to 12 million cases of smallpox, with around 2 million deaths.

a) Mass immunization strategies

Mass immunization campaigns, based on goals of 80% coverage, had been successful in eradicating smallpox from countries with relatively well-established health infrastructures. In collaboration with the Panamerican Sanitary Bureau, many Latin

American countries had eradicated smallpox as of 1950.[28] As early as 1964, however, it had been noted that 80% immunization coverage was not sufficient to achieve eradication in countries with large populations, scarce resources and few trained health personnel, because of important segments that remained inadequately immunized.[29] A more comprehensive approach to eradication was proposed with a preparatory phase of detailed planning, an attack phase to reach 100% coverage, followed by a control phase which continued with vaccination until such time as eradication was assured.[29] Attempts to correct major failures in implementation were made: improving programme supervision, decreasing the concealment of cases, using more stable vaccines, and strictly adhering to a maintenance programme after eradication was achieved.[6]

b) Surveillance and containment strategies

Selective epidemiological measures were introduced in endemic areas in West Africa in 1967 as an alternative strategy to mass vaccination.[12, 30] This occurred after an incident in Nigeria when vaccine supplies had not arrived and the programme manager directed vaccination efforts to known foci of current transmission,[2] leading to swift eradication in those foci and effectively ending smallpox transmission in just two seasons. This implied that 100% immunization coverage was not a requirement for eradication; in fact, eradication in West Africa was achieved with lower levels, one example being 69% in Sierra Leone.[31] Surveillance and containment were the components of this alternative strategy, with surveillance actively identifying all smallpox cases that occurred through a series of actions of case identification, and containment being the ensuing action taken to isolate cases and vaccinate all possible contacts.[6, 9, 12, 32]

Epidemiology and technology jointly aided the eradication process, however, it is suggested that managerial innovation and commitment were crucial to success. The intensified campaign was the all-out effort to eradicate smallpox from 33 endemic countries, based on the adequate commitment of resources by participating nations, donor nations and direct allocations from the administrative budget of WHO.[6] The mobilization of resources and extreme detailing of employee activities have produced analogies with military campaigns with vertical structures.[9, 13]

Information management

Information management can be considered as the design and implementation of information systems, these having been defined as a set of organized procedures that, when executed, provide information for decision making and/or control of an organization.[33] Vertical structures were instrumental in introducing effective, active information management in the smallpox eradication programme. The level of notification of smallpox cases had been low, for example, 2.5% for Brazil,[34] 2 to 10% for India.[35] Methods of passive notification were not working; in fact, in many instances, concealment of cases was deliberate because health workers were punished if smallpox was notified, on the theory that they were not fulfilling their vaccination responsibilities.[35] In India, there was little regular reporting before 1972; data were received up to a year later and statistical units had little orientation towards disease control activities.[36]

Regular and active surveillance methods

Active surveillance became the key instrument of data collection and management,[32] with appropriate analysis leading to the reprogramming of activities, where necessary, and to concentrated action, for example, in the case of an epidemic. Effective surveillance was based on the relative ease of smallpox recognition as well as on the fact that chains of transmission could be broken by small but rapid and thorough containment actions.[6] To be effective, an information system required total coverage in any given country, in order to guarantee the detection of all cases and interrupt transmission. Weekly epidemiological reports became standard practice, even when no smallpox cases occurred;[35, 37, 38] in India, all health workers were involved in case reporting.[35] Regular and active surveillance methods were used. The former referred to the reports made routinely by health workers; in this, a new impetus was given through the design of forms that required separate reporting for smallpox. In India, weekly reports were sent by field workers every Saturday to district headquarters, from where consolidated reports were sent to state headquarters the following Wednesday; in this way, local reports were in New Delhi within about two weeks.[35] This was a major innovation in the India programme.

Active surveillance was based on the search for smallpox; searches became national events, such as a series of week-long searches in India, held once a month in endemic areas and once every three months in non-endemic areas. Such active searches were actually instrumental in locating epidemics, which were otherwise unreported.[35] In Bangladesh, because of the influence of urban centres in the transmission of smallpox, searches were carried out in strategic locations, such as transport terminals and markets.[37] In all cases, simple reporting systems were used to assure speed and accuracy of reporting from the field; this corroborates recommended principles for data collection in developing countries.[39] The insistence on accurate notification was not only essential for containment action, but also to give more precise indicators for planning purposes. It is widely reported that improved surveillance actually increased dramatically the reported incidence of smallpox in most endemic countries.[40] Surveillance relied upon human resources mobilization; India, during its search weeks, mobilized up to 124,000 health workers.[35] Bangladesh centred its operations around 14,000 family welfare workers.[37] Ethiopia, in contrast, relied on two-person surveillance teams located in regional capitals.[6]

Use of recognition cards, rewards, and feedback

One of the facilitators in surveillance was the use of a very simple but effective tool, the recognition card, originally devised in Indonesia[6] but subsequently used in many other countries.[35, 37] This was a photo of a person showing the full symptoms of smallpox, which was used by the surveillance team member to enquire of the general public whether they had seen any cases with such symptoms. The card was a great aid in public searches, especially in markets and other gathering places.[41]

Another effective tool was the giving of rewards to individual health workers and members of the public who reported a case of smallpox.[6, 35, 37] This departed from the more traditional punishment given for failing to report and led to a greater degree of certainty in notification. Rewards of US$ 3 were initially given in Bangladesh, which, compared to average income per capita rates of under US$ 100, signified a considerable amount. Rewards increased in magnitude with the decrease in incidence of smallpox, to maintain the incentive to search actively for cases.

Another part of information management that was effectively used was feedback mechanisms, especially referring to assessment techniques. Assessment was used primarily to verify the results of immunization campaigns.[14, 31, 34, 35, 37, 42, 43] Visits would be made to areas that had recently been the foci of campaigns, and through sampling techniques, the numbers and quality of vaccinations would be ascertained; deficiencies would lead to an immediate follow-up visit by a vaccination team. Although of immense advantage as an informational tool, this was also a performance-testing device that led to rapid corrective action, where necessary, and to reprimand, where failings in duty were revealed.[37]

Information production and exchange

Information production was improved at all levels. Manuals and guides were widely used, including a 265-page handbook produced by WHO in 1967,[6, 44] as well as numerous uses being made of operations manuals at the national level.[35, 37, 45] They enabled workers at all levels to have appropriate and relevant information at hand for the work they were undertaking.

Some countries produced a local newsletter specifically for the exchange of information in the national eradication campaign; the *Eradicator* in Sierra Leone was one example.[31] These enabled exchanges of experience on differing local techniques used in the campaign; they also introduced a certain amount of friendly competition into the eradication environment by highlighting teams with high performances.

International reporting and information exchange increased with the intensified campaign; WHO continued to produce both regular briefs and technical papers on the situation of smallpox in issues of its *Bulletin* and *Chronicle*, in a more intensive way. These served to maintain world-wide attention on the smallpox eradication programme.

Personnel management

Motivation of health workers and the public

Personnel management has been defined as the attraction, selection, retention, development and utilization of human resources to achieve both individual and organizational objectives.[46] The eradication programme mobilized 200,000 health workers and 700 international staff.[24] This is particularly noteworthy given that many health workers had to be completely reoriented in their attitudes to notification and action, in order to improve case detection. A large number of workers were recruited specifically for the eradication campaign, with a successful campaign meaning they would be out of a job. The ability to motivate staff was, therefore, an aspect that required considerable attention. The use of both manuals and newsletters in conveying information has been referred to above. The vertical nature of the eradication programme in many countries facilitated the setting of tasks and responsibilities; in most cases, these were clearly set out in job descriptions.[14] Equally, the hierarchical nature of the programme gave a clear indication of supervisory responsibility. The fact that supervisors spent a great deal of their time in the field, actually outside of the country capital and provincial capitals, guiding, assessing and motivating staff under their responsibility, made a very positive impact on the implementation and achievements of eradication activities and enabled strict planning to be followed closely.[24, 35, 37]

This provided a work environment that made situations that were often of a very difficult nature, with people working in very isolated conditions, easier to manage. Teamwork was of the essence, as seen in Sierra Leone.[24] The use of rewards, mentioned above, also lifted the level of motivation of field workers. Members of the public also received identical rewards for notifying a case of smallpox and a great deal of publicity was given to their presentation in order to motivate people for further action; the effect was essentially to minimize the likelihood of missing a case, thus to increase sensitivity and decrease specificity, which was important especially in the final stages of eradication. Rewarding both the health worker and the member of the public ensured reporting to the health system. It is interesting to note that many countries educated schoolchildren to act as sentinels for cases of smallpox;[43] it was found that children had a considerable amount of relevant local knowledge and, in more traditional societies, were more receptive to the need for case reporting, aided by their natural curiosity with regard to new events. Guinea, in contrast, depended on its well-developed political and administrative network to mobilize the public, both for reporting and immunization campaigns.[42] Traditional leaders and a centralized form of local government in northern Nigeria aided in the mobilization of people for vaccination.[43] Considerable attention has been given to mobilizing the public for vaccination, comparing collection-point strategies to household-to-household coverage.[1] The former was particularly successful in West Africa, where Niger, Dahomey (now Benin) and Togo, as well as northern and western Nigeria, were assessed in this regard using sampling techniques specifically adapted for use in West Africa.[43] In Brazil, it was demonstrated that a team of three persons using one jet injector and a collection-point strategy was able to perform work equivalent to that performed by a team of 38 vaccinators and their supervisors when using multiple-pressure vaccinations and a door-to-door approach.[47]

Strategies in personnel management, therefore, included intensive motivation, supervision and assessment, as well as employing innovative means to gain the cooperation of the public and support for the eradication campaign. Publicity drives were common features, utilizing a series of communication methods, from posters to radio programmes.[35, 37, 41, 42] These tools were vital in bridging potential gaps between vaccinators and the general public to overcome the resistance often found to vaccination. Local knowledge was of particular importance in producing informational tools that would have an impact on the cultural and social values of the society. Public mobilization was important and, often, advance teams would pave the way for the vaccinators; such a strategy was common in West Africa.[31]

Training and deployment of health workers and of temporary vaccinators

Personnel management frequently involved the training and retraining of health workers, both in epidemiological techniques and in administrative practices, largely through the use of intensive courses lasting up to 10 days.[32, 42, 45] Weekly meetings between staff and supervisors were held at all levels in the Bangladesh programme, to exchange information, evaluate activities and plan for the following week's work.[14, 37]

It should be noted that the administrative staff of the large eradication programmes in India and Bangladesh made full use of temporary staff, largely as additional vaccinators, who were hired on the spot in the field and trained in a matter of 20 minutes in the use of the bifurcated needle.[35, 37] The ability to do this was a great asset in quelling epidemics without having to call upon additional outside workers. There were other instances, for example in India, when large-scale redeployments of health workers from one state to another took place, mainly from non-endemic areas to endemic areas, in order to allow their participation in massive campaign efforts; such was the case in Bihar, where eradication largely depended on this responsive action.[35]

The comparative means of successfully mobilizing health workers for campaigns is worthy of mention. Mobile teams accounted for the successful campaigns in West Africa,[31, 42, 43] where populations were mobilized to collection points for vaccination. In India and Bangladesh, in contrast, house-to-house strategies were adopted for populations that were extremely mobile by nature, thus ensuring that itinerant people, such as beggars, who were often important points in the transmission chain, would not escape surveillance and vaccination.[36, 48]

Material resources management

Location of funds at field level

The smallpox eradication programme, including the example of human resources mobilization in Bihar, necessarily required the back-up of material resources, as well as financial management, in order to cover local salaries and operational costs. Twenty-five-day field tours per month were common for health workers in Bangladesh, requiring a continuous availability of funds for expenses.[37] The most striking action of the large campaigns, for example in India and Bangladesh, was to locate funds directly at field level.[35, 37] Chosen international and national staff had financial authority in the field, opening imprest accounts (accounts that maintain an agreed minimum balance and are replenished on going below this) for immediate financial mobilization. Guidelines were set up to give an indication of the types of expenses that could be covered; for example, in India, daily salary rates for locally recruited personnel were established at 60 cents for watchguards, searchers and vaccinators and US$ 1.25 for supervisors.[35] Standard report formats were used to account for transactions that had taken place within a set time period.

Covered under such accounts were additional temporary personnel, gasoline costs, miscellaneous material needs, salaries of guards needed to isolate infected houses effectively, as well as food for those affected, in order to ensure their isolation and make up in part for lost production.

Concentrated logistics effort

Rich experiences were gained in logistics. The team arrangements in West Africa, which allowed progress through the countryside to be made in ordered waves—the advance team followed by the vaccination team, itself followed by the assessment team[31, 42]—represented a good example of efficient planning and of the effective use of resources. Another aspect of this was the fact that activities were often carried out in the early morning or late evening in order to catch all the inhabitants before they dispersed for their daily work or after they had returned home.[37] This type of concentrated effort maximized programme efficiency.

Resource mobilization and allocation

The availability of both national and international resources was instrumental in achieving eradication. This was not necessarily due to the quantities available, although the eradication programme, on which US$ 313 million were spent between 1967 and 1980, cost much less than the control programme it would eventually make redundant, which had expenditures amounting to an estimated US$ 1 billion per year.[6] Of particular note in many situations were the allocations made by WHO to in-country local costs; up to 45% of the contribution of WHO to the Bangladesh campaign was for local costs, for the types of operational items mentioned above.

A vital factor not to be overlooked is the careful assessment that was made of material requests before requisition was completed. The most typical example was for field workers to request inappropriate means of transportation.[37] A close knowledge of prevailing conditions determined, however, whether such requests were valid or not. Without such scrutiny, resource wastage would have been prevalent and operational effectiveness reduced.

The shipment of vaccines improved with the stable freeze-dried type; however, careful attention was given to the avoidance of running low on stocks, in case of an epidemic.[35] Vaccine lots were rationed out normally on a weekly basis, coinciding with the weekly meetings of staff at the local level.[37] Vaccines that had not been used were destroyed at the end of the week so as not to run the risk of lowering their potency. Whilst this produced some resource wastage, the counter-risk was for immunized people eventually to contract smallpox due to low-potency vaccine, which would have seriously harmed campaign credibility.

The vertical nature of the smallpox programme was followed in India to the extent that a separate administration, a "system-within-a-system", was created to handle all the programme resources;[35] this was seen as a justifiable step because of the size of the programme. Another facilitating factor in accelerating resource management was the setting up of radio networks to improve communication in the chain of command.

Some lessons learned

There are clear indications that management issues are coming to the forefront of attention with regard to development efforts. Management systems have been seen as being at the very core of a proper development that produces the necessary physical goods and services for the people.[49] In the field of immunization, it has been recognized that critical constraints may be managerial (at all levels) rather than financial.[50]

In the smallpox eradication campaign, management interventions were innovative and efficient. Some particular examples are demonstrated.

- Eradication cost US$ 313 million over 13 years, in contrast with an estimated cost to the USA, in 1968 alone, of US$ 150 million for prevention and control.[51] This proved original macro-economic considerations as to the projected cost effectiveness of eradication. Ethiopia, with its extreme difficulties of access to large segments of the population, eradicated smallpox through the mobilization of 1,000 health workers and 10 international epidemiologists, as well as the use of advanced means of communication, including helicopters.[9] This shows the value of concentrated effort.
- The morale and enthusiasm of field workers were more sustained when they participated in research, either by providing material for laboratory study or by conducting epidemiological studies.[11] Attention to worker morale is of high importance if objectives are to be achieved.
- In India, if needed, food and lodging were provided to smallpox patients to encourage isolation and guards were hired. Follow-up visits to points of isolation were made twice a week for a four- to six-week period. International support to local operational costs facilitated this action.[35] Meticulous planning

and the appropriate location of financial resources were crucial aspects in breaking transmission chains.

- In Bangladesh, one-week courses were given every month for each batch of incoming international staff, including administrative briefing on finance and accounting procedures, transport, supply and radio operations.[37] In training courses in Guinea, automotive care and safety were repeatedly emphasized and drivers were given supplemental training.[42] A high profile was given to logistics and administrative matters to maximize the efficiency of operations.
- One of the lessons from Bangladesh was that public confidence was not built on public pronouncements but on effective action with regard to the real needs at the village level.[14]

In essence, it was the vaccinator in the field who ultimately determined the success of the smallpox eradication programme. For the vaccinator to be able to accomplish the work successfully, an enormous effort in resource mobilization was required, governed by careful planning.

The obvious question that has been asked is what lesson does the success of the smallpox eradication programme have for other communicable diseases, notably measles. There are different points of view, both for and against a global eradication of measles.[13, 52, 53] There are distinct epidemiological differences between smallpox and measles,[54] in particular the slow transmission rate of the former and the fast rate of the latter. The clinical spectrum of measles ranges from a mild, self-limiting illness to a fatal disease, depending on case management and the presence of unfavourable nutrition levels and/or concurrent infections.[53]

Expanded programmes on immunization are, nevertheless, being carried out in many countries and the need for innovative management interventions is recognized; the experience of the smallpox eradication programme provides a basis for decision making for other programmes. The main dilemma is in organizational structure. The smallpox programme benefited from a vertical structure in many countries, keeping clear lines of responsibility and resource movement. The ability for such clarity is less obvious in integrated programmes, in the line of primary health care approaches. One main disadvantage of vertical programmes, nevertheless, is the attachment of considerable resources to a sole main objective, thus diverting attention from possible alternative and potentially more efficient uses. The dilemma resides largely in the ability to set priorities and the degree of commitment to any one particular objective.

An apparently unanswered question in the smallpox programme resides in the concept of competing causes of death, that is, whether eradication had any impact in the reduction of either overall death rates or age-specific death rates. Related to this are the decreased levels of morbidity that should be apparent with the elimination of 10 to 12 million cases of smallpox, that is, less blindness and disfiguration.

Isolating a single disease for eradication remains, therefore, more complex a proposition than would be apparent. The lessons of the smallpox eradication programme lie, nevertheless, in resource mobilization as a key ingredient to success. The ability to put financial resources in the field, the ability to maintain large numbers of field workers motivated under often extremely difficult conditions as well as an efficient and reliable information system are major pointers to directions that can be followed in the future.

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Case studies

Turkey

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Case study

The national immunization campaign of Turkey

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The Turkish national immunization campaign, launched by the country's president on 11 September 1985, has attracted world-wide attention: its ambitious objective was to immunize 80% or more of the country's 5.1 million unimmunized children in the three-month campaign period. This was the first campaign in recent history which succeeded in obtaining more than 80% measles vaccine coverage of eligible children under 1 year old.

Pre-campaign statistics showed 29,000 Turkish children dying every year (a rate of 80 a day) from measles, pertussis and tetanus, with more than half that number permanently crippled by measles and polio. Surveys indicated that routine immunization services were ineffective in providing adequate nation-wide coverage against the vaccine-preventable diseases, probably barely a fourth of the country's children being fully protected against them.

The campaign was designed to use existing material and human resources as far as possible in order to keep costs at an affordable level and to ensure that the benefits of the campaign would be maintained after it was over, through continued reliance on the experience gained and enthusiasm generated during the campaign.

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Above all, it was considered essential to focus on social mobilization in order to create the "critical mass" necessary to bring the vaccines effectively to the children. In addition to political support and the involvement of the health sector, the country's religious leaders and the media played a highly effective part in putting over the message, and a wide range of contributors (including local leaders, companies and service organizations, teachers and schoolchildren, artists and entertainers) played equally important parts in donating materials or their own time to the success of the campaign.

This case study describes why and how the campaign was organized, and presents the final immunization results.

> *"Know the value of life before death comes, and of health before becoming ill..."* (the Quran).

According to the October 1985 national census, the population of Turkey, which has a total surface area of 774,815 square kilometres, numbers 51 million people, more than half of whom live in urban areas. In 1984, the annual development rate stood at approximately 4.5%, with a per capita GNP of US$ 1,200. As in other developing countries, a high percentage of the total population (39%) are under the age of 15, while 13% are under 5 years of age. The infant mortality rate (IMR) is 95‰, and the causes of infant morbidity and mortality are similar to those of many other developing countries: acute respiratory infections, diarrhoeal diseases, incorrect feeding and weaning practices, and the vaccine-preventable diseases, especially measles.

Reducing the infant mortality rate

The Five-Year Development Plan drawn up for the period 1985-1989 recognized the reduction of the IMR as being one of the most crucial targets of the national health policy. In May 1985, a tripartite agreement was entered into between the Government of Turkey, UNICEF and WHO for a five-year programme of cooperation for child survival and development, designed to strengthen primary health care (PHC) services and extend them nation-wide. Its specific objectives included reducing the IMR to below 50‰ live births by 1990, as well as reducing early childhood mortality rates, to which increasing immunization coverage of the vaccine-preventable diseases to 80% would make a significant contribution.

A national immunization campaign with full political support

Once the strategies and targets for each of the priority objectives of the PHC programme had been agreed, the Government of Turkey, in furtherance of its goal to reduce infant and early childhood mortality, decided to launch a nation-wide immunization campaign as a spearhead for the introduction of other programmes under the new accelerated PHC approach.

The campaign, designed to immunize some 5.1 million children in three 10-day phases, each four weeks apart, had the personal support of the head of state. As a visible demonstration of the political will existing to reduce child mortality, telecast all over the country, President Kenan Evren opened the campaign on 11 September 1985 by immunizing two children with oral polio vaccine, together with James P. Grant, the executive director of UNICEF, the prime minister, Turgut Özal, the minister of health, Mehmet Aydin, and other high-ranking government officials.

Simultaneously, the *valis* (governors) of all of the 67 provinces were also personally launching the campaign nation-wide by immunizing children in each provincial capital. Meanwhile, 41 million doses of vaccine had been delivered to the 45,000 vaccination stations all over the country, and all 536 *kaymakams* (prefects) were also immunizing children to launch the campaign in their districts.

Immediately after the launch in Ankara, government ministers and deputy ministers from Egypt, Pakistan, the Sudan and Syria met with President Evren to obtain information on the rationale for the Turkish campaign, its implications at various levels and its organization, with a view to immunizing all the children of their five nations before the end of this decade.

Continued political will at the highest level was again manifest when the second and third rounds were similarly inaugurated on 18 October and 25 November in order to maintain momentum. High-level representatives of the People's Republic of China attended to observe the launch of the second round.

The inauguration of the third round was again launched by the president and prime minister and by James P. Grant, executive director of UNICEF, and observers from other countries interested in learning from the experience of the Turkish campaign including Bangladesh, Indonesia, Nigeria, Viet Nam and the Democratic Republic of Yemen. On the day prior to that launch, a first-division football match played in Ankara to promote the campaign was televised, and the team captains held infants in their arms as they urged parents to have their children vaccinated.

Why a campaign?

As in other countries which are in the process of accelerating immunization programmes and extending them nation-wide, there had been some debate in Turkey as to whether increased immunization coverage could best be achieved through the routine health services or a mass campaign.

Immunization efforts undertaken by the routine health services had not produced satisfactory coverage rates due to a number of constraints, including problems in transporting vaccines, difficulties in delivering immunization services at a convenient location and time for parents, the insufficient number of vehicles and vaccine carriers, lack of fuel, inadequate storage and cold store facilities, and particularly by the lack of active promotion of immunization services, with the corollary that the importance of immunization against infectious diseases was not well understood by the public.

The supporters of the campaign strategy considered that the modern campaign approach, with the high degree of social mobilization it entails, was the only way of breaking away from these constraints in order to raise coverage to the key level of 80%. As in other developing countries, the routine immunization services had generally fallen short of this target.

Opponents of the campaign strategy claimed that the coverage levels achieved in a campaign can never be maintained by the routine services because campaigns are artificial and impermanent, creating false expectations among the public and ultimately undermining and demoralizing the health services. Supporters of the campaign believed, however, that the country's routine vaccination services alone could never bring about the breakthrough needed to raise coverage to the desired level of 80%, although they should be able to maintain it at that level once it was achieved, in view of the fact that many of the constraints to which past campaigns were subject could be overcome by the use of the improved technical capabilities and social mobilization techniques developed in recent years.

It was considered essential to avoid the "vertical" approach used in many past campaigns, whereby all the work is allocated to a special immunization operations group not forming part of the regular health structure. The often narrow and non-collaborative nature of these external groups meant that once their year or so of campaign activities was over, a vacuum was left, with little or no hope of continuation. In such circumstances, coverage is bound to decline and cynicism set in.

When the Turkish immunization campaign was planned, elaborate steps were taken to achieve full integration by ensuring the participation of many permanent government structures in addition to the crucial involvement of the health services. The emphasis was placed on involving the staff who would normally be responsible for maintaining the achievements of the campaign through the regular health services, so that the enthusiasm generated in the rank and file of the service would obviate the danger of a serious decline in momentum once the campaign was over.

Low immunization coverage prior to the campaign

As no formal evaluation of immunization coverage had previously been carried out on a nation-wide scale, a baseline survey was undertaken in August 1985 by the Hacettepe Institute of

Population Studies (HIPS) to determine the average immunization status of children up to 60 months old.

HIPS personnel, comprising 120 medical students trained as interviewers and 20 supervisors, collected data samples from 5,800 households in rural and urban areas of the country using a stratified cluster technique, in order to establish a statistical base against which the immunization coverages achieved during the campaign for the five diseases could be measured. The survey was carried out by 10 teams which covered 13 areas, divided into communities with populations of under 2,000; 2,000-5,000; 5,000-10,000; 10,000-20,000; 20,000-50,000 and over 50,000. The results of the survey were processed by computer and held for comparison with the campaign results.

The overall immunization coverage for the under-5 age group prior to the campaign was found by the HIPS[1] to be 25%, and it was much lower in some areas.

Objectives

The immediate objective of the campaign was to immunize some 4 million children against five major diseases (measles, diphtheria, pertussis, tetanus, and polio), clearing the backlog of unimmunized children, with a view to achieving 80% coverage of the target population of 5.1 million, namely all vaccine-eligible children under 5 years old. Priority was to be given to infants aged 0-12 months.

The action required to achieve this goal included:

- strengthening the immunization component of PHC, including improving the cold chain, training health personnel on immunization-related subjects, and improving the existing registration system;
- establishing cooperation with various "non-health" sectors in promoting child health nation-wide;
- providing health education, with a view to increasing public awareness of the prevalence of infectious diseases among children and the importance of their prevention by immunization.

In view of its longer-term objectives, namely to act as a spearhead for the progress of the overall PHC programmes, it was decided that the immunization campaign would rely on the same staff, structures and networks, serving to prepare the ground for a later rapid expansion of services, particularly in the areas of oral rehydration, growth monitoring, improved weaning practices as well as of respiratory diseases.

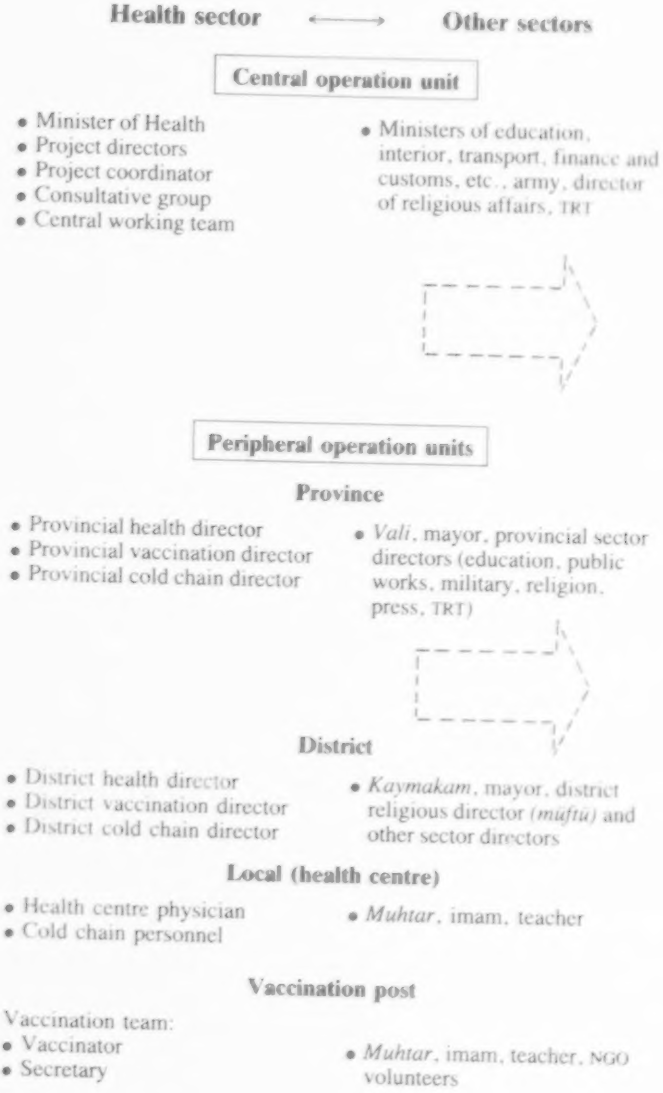
Organization of the campaign

In April 1985, a delegation of seven senior Turkish government officials and two UNICEF officers visited UNICEF Headquarters in New York, the Centers for Disease Control in Atlanta, and the National Vaccination Crusade in Colombia to discuss and observe immunization campaign approaches. Following this visit, the main decisions were taken on the organizational framework for the campaign.

Schedule for vaccine administration

During the campaign, the standard administration schedule for non-immunized infants and children under 5 years of age was set at three doses of DPT and oral polio at one-month intervals, and one dose of measles vaccine. The age for measles vaccination was reduced from the 12-15 months earlier followed in the routine immunization programme to 9 months. DPT and polio boosters were to be administered to children in the 13-60 month age group who had already received three doses at least 12 months prior to the campaign.

For technical and administrative reasons, the BCG vaccine for infants and tetanus toxoid for women of childbearing age were omitted from the choice of vaccines for the campaign. However, administration of these vaccines continued under the routine programme in 1985, to be accelerated in 1986.



Health sector ⟷ **Other sectors**

Central operation unit

- Minister of Health
- Project directors
- Project coordinator
- Consultative group
- Central working team

- Ministers of education, interior, transport, finance and customs, etc., army, director of religious affairs, TRT

Peripheral operation units

Province

- Provincial health director
- Provincial vaccination director
- Provincial cold chain director

- *Vali*, mayor, provincial sector directors (education, public works, military, religion, press, TRT)

District

- District health director
- District vaccination director
- District cold chain director

- *Kaymakam*, mayor, district religious director *(müftü)* and other sector directors

Local (health centre)

- Health centre physician
- Cold chain personnel

- *Muhtar*, imam, teacher

Vaccination post

Vaccination team:
- Vaccinator
- Secretary

- *Muhtar*, imam, teacher, NGO volunteers

Fig. 1: Organization of the national immunization campaign

Pre-campaign activities

- Planning: defining target population, needs and activities
- Coordination: multisectoral meeting; *valis'* meeting; periodic joint meetings with UNICEF
- Training: course to provincial health directors and vaccination directors; annual EPI high-level course
- Training materials: preparation of booklets, forms, video cassettes, etc.
- Logistics: procurement and distribution of cold chain material and vaccines; cold chain assessment
- Supervision: visits to provinces (two tours)
- Evaluation: improvement of record system; situation analysis on records and survey
- Social mobilization: press, TRT, NGOs

- Regional cold chain course in five provinces
- Training courses for all level personnel
- Installation of cold chain equipment; distribution of equipment and vaccines
- Supervision (visits to districts and health centres)
- Evaluation (provincial situation analysis and reports)
- Social mobilization
- Provincial public health assembly

- District public health assembly

- Household registration and definition of immunization status of every child, listing the target population
- Public training and information

Division of responsibilities

National level (central operation unit)

From the launch of the first round on 11 September 1985, the Ministry of Health and Social Assistance (MOHSA), with its central and field organization, directed, coordinated and ensured the smooth implementation of the immunization campaign through a Project Directors' Committee composed of the under-secretary of health, the director-general of PHC, the director-general of MCH/FP, and the project coordinator.

The project coordinator, seconded from Hacettepe University, was assisted by a working group of staff drawn from the MOHSA, UNICEF and Hacettepe University.

An Advisory Board was also set up, composed of the vice-directors-general of PHC and MCH/FP and advisers from national and international organizations. Two other advisers were recruited by UNICEF for the campaign period, one to help formulate a plan of action and a monitoring and evaluation system, the other to train personnel and give advice on field operations.

An Interministerial Coordinating Committee was also set up, its members being senior administrators from all the relevant non-health sectors, including the Ministry of Education, Youth and Sports, the Ministry of the Interior, the Directorate of Religious Affairs, Turkish Radio and Television (TRT), and the Turkish army.

Regional and subregional levels (peripheral operation units)

One supervisor from the central MOHSA staff was responsible for each region. These supervisors undertook two visits to each of the provinces under their jurisdiction during the preparatory phase of the campaign, and any additional supervisory visits necessary to solve problems as they arose.

One immunization coordinator was appointed per province to work full-time on the campaign, under the provincial health director.

These coordinators were responsible for:

a) defining the target population within each province and identifying those groups in greatest need of immunization;

b) designing the methods according to which the 10-day vaccination campaign rounds would be conducted at the community level, working together with health centre personnel and representatives of village health committees;

c) training and supervising all provincial health centre personnel;

d) distributing the material and supplies sent from the central depot to health centres and villages as requested;

e) ensuring the cooperation of all provincial governmental and non-governmental bodies in all aspects of the campaign;

f) supervising the organization of data collection and calculating coverage rates.

District level

The district director of health or chief physician of the MCH/FP clinic acted as district immunization coordinator, supported by the health centre physician, who was appointed health centre immunization coordinator.

Figure 1 shows how the various levels of organization were linked and the activities each was involved in.

Three elements to generate a "critical mass"

The campaign was based on three main elements—social mobilization, skilled health manpower, and supply and logistics—the combination of which generated the "critical mass" necessary to ensure its success. Figure 2 shows how social mobilization, supply and logistics converged to bring both the vaccines and the children to the vaccination points.

The main tasks of informing, persuading and motivating, as well as providing and transporting logistical field support were

GETTING THE VACCINE TO THE GROUND (SUPPLY AND LOGISTICS)

Action	By whom	How
1. Procure and transport vaccines to Turkey	UNICEF	
2. Protect and store vaccines in Ankara	MOHSA and UNICEF	
3. Move vaccines through cold chain to most extended vaccination point, i.e., Ankara-province-district-health centre	MOHSA, Ministry of Interior, army, Turkish Airlines, UNICEF	

VACCINATION POINT:
health centre serving several villages/communities

Action	By whom	How
7. Commend / reward / commit mothers to next visit (after vaccination recording)	Staff at health centres, health workers, midwives, delegates of *muhtars*	
6. Assist / speed up / facilitate vaccination process	Midwives, teachers, health workers, volunteers	Two-page "how to" brochure
5. Take or direct mothers and children to the vaccination point	*Muhtars*, teachers, delegates of *muhtars*	
4. Brief mothers: vaccination date, place, process	Midwives, nurses, teachers, *muhtars*	Simple booklet
3. Identify and register eligible children (house-to-house enumeration)	Nurses, midwives, health workers, teachers	Simple written instructions
2. Create felt need among mothers	Religious leaders, media, teachers, *muhtars*, councils of elders	Simple instruction booklet
1. Create overall awareness in communities and families	Media	

GETTING THE CHILDREN TO THE VACCINE (SOCIAL MOBILIZATION)

Fig. 2: Convergence of supply, logistics and social mobilization

shared with the MOHSA by government bodies that had previously seldom been active in health activities, but each of which had capabilities that were indispensable to the success of the campaign. Many other sectors of the community made equally valuable contributions.

1. Social mobilization

Of the three elements, social mobilization was the least traditional but most crucial; in many cases, it is the factor which makes the difference between pre-campaign coverage levels and those achieved during a campaign. The need for social mobilization rests on the premise that in developing countries the health sector alone does not have the means to reach and fully cover populations which are mostly rural. The problem is mainly social passivity, not technical incapacity. Help from other sectors—especially from the top political leadership of the country—is needed. Once a head of state has personally committed himself and the nation's ministry of health to immunization or a similar effort, other ministries and agencies can quickly be motivated to join in an effort that will significantly extend the reach of the health services. This is what happened in the Turkish campaign.

The dynamics of the process

The process began with the creation of overall awareness of the importance of vaccination at the community and family levels, mainly through the media. Such awareness requires simultaneous local reinforcement to create a felt need among mothers. The messages conveyed by the media were given further credibility when repeated and amplified by the imams, *muhtars* (village heads) and teachers, who were well-known to the community and represented trusted advisers with recognized moral authority. Only then were all children eligible for immunization identified and registered through house-to-house enumeration.

Shortly before the campaign, mothers were briefed on the date and place to which they should take their children, and on the vaccination days themselves. Religious leaders, *muhtars*, teachers and health workers were again present to assist in ensuring that the vaccination process operated as smoothly as possible.

While this complex process was unfolding, vaccination workers and other health staff were being trained, and the vaccines were being brought through the cold chain to each vaccination site. Two essential features of the Turkish social mobilization process were the fact that each step built on what had gone before, and that the same persons were involved at almost every stage, culminating in their attendance on the vaccination days. In this way, increasing enthusiasm was built up among all those involved, mothers, workers and volunteers alike.

Making direct contact with all potential allies

The success of the social mobilization achieved in the Turkish campaign was due to a large extent to the high-level support obtained. Anyone considered to be in a position to make a significant contribution to the campaign was approached directly, from the president through government ministers and religious leaders to artists and service organizations. For example, the president of the Directorate of Religious Affairs, the country's highest religious leader, was contacted directly, as was the regional governor of Rotary, and this approach extended to contacting artists and entertainers personally to recruit their support.

A nation-wide multimedia campaign to raise overall awareness

The first step was to increase public awareness of the campaign, and motivate mothers, the key figures, to bring their children to the vaccination centres. This was the task of the national newspapers, the Anatolian Press Agency, and TRT, which designed messages and programmes broadcast daily over the national radio and television networks. On average, six major articles were carried in the main national newspapers every day from 1 August 1985 until the inauguration of the campaign. Many local newspapers also gave special coverage to the campaign. Popular slogans were devised for use in spot announcements and jingles and on posters and billboards. Two of the country's best-known comedians prepared skits on immunization, and other personalities offered to lend their support. A travelling children's theatre group toured the country to promote immunization, giving as many as five performances a day. A logo for the campaign was designed by a young teacher of fine arts, and an immunization march written by a leading Turkish composer, Yusuf Nalkesen, became the campaign theme tune. A round-table discussion on immunization, with the minister of health as main participant, was broadcast two days before the start of the campaign.

The campaign by TRT was timed to culminate during the week preceding the first phase of the campaign, beginning in June with educational programmes on immunization, building up in July and August with motivational slots, and giving information from the beginning of September onwards on when and where to go on the vaccination days. In all, TRT gave the equivalent of about US$ 10 million in free time on television and radio; an extremely useful contribution in view of the fact that the country has some 30 million television sets.

A motivational video cassette was prepared for use through all channels, including 10,000 coffee houses throughout the country, the majority of which are equipped with video recorders. In addition, a documentary on the campaign, intended for global audiences, was filmed by UNICEF. The Postal Service produced a franking stamp for the campaign, which printed an immunization message on all mail; posters were designed free of charge by Turkish artists; and explanatory leaflets were dropped by helicopter in some areas.

This extensive media effort was extremely successful in reaching the community; when asked how they had heard of the campaign, parents almost always cited television first, followed by radio.

Creating a felt need at the local level

These broad public messages then needed to be reinforced by personal follow-up in urban neighbourhoods and villages. It was considered that the task of local reinforcement could best be carried out by the *muhtars*, schoolteachers and imams. The responsibility for assigning their particular duties before and during the campaign lay with the Ministry of the Interior, the Ministry of Education, Youth and Sports, and the Directorate of Religious Affairs respectively.

Administrative mobilization by the Ministry of the Interior

The leadership and coordination of all community and local support activities in Turkey fall under the responsibility of the Ministry of the Interior. As the state representative in his province, the *vali* is responsible for all social development programmes and policies at the provincial level. He is supported at the district level by the *kaymakam* who supervises general administration, and in the villages by the *muhtar*. All these officials therefore had a key role to play in organizing and mobilizing communities in preparation for the campaign.

A one-day meeting was held at the Ministry of the Interior in Ankara on 8 July 1985, attended by all 67 *valis* (the first time in the country's history that they had all participated in a health-related meeting), in order to solicit their support, identify their particular responsibilities, and discuss strategies and approaches. Earlier, the prime minister had issued a directive to all ministries to cooperate in making the campaign a success.

At the local level, the *muhtars* promoted the campaign by visiting all families in their communities, emphasizing the importance of bringing all eligible children to the vaccination sites on the correct dates, and motivating others involved. The *muhtars* were also responsible for organizing the eligible children into groups of similar sizes that could readily be handled in one day by the staff at the vaccination site, and for coordinating transportation of the mothers and children accordingly during the campaign rounds.

Motivation and operational assistance from the education sector

The Ministry of Education, Youth and Sports was the first outside the Ministry of Health to show a keen interest in the campaign. At the preparatory stage, considerable attention was given by the ministry to community-based health education, in addition to assistance in printing public education material. The ministry requested the cooperation of its field personnel and teachers, and all 220,000 primary schoolteachers were requested to report early for duty prior to the start of the school year in order to assist in campaign preparations. Committees were set up at the province and district levels in support of the campaign under the chairmanship of the directors of education, youth and sports. Teachers participated in in-service training programmes given by health personnel on the essentials of immunization, and subsequently organized parent meetings to ensure that the message was passed on. Schoolchildren were also motivated to act as agents of change within their families by raising awareness of the benefits of immunization. Messages were included in literacy programmes for women and given at other classes held at the people's education centres. On the actual vaccination days, over two-thirds of the country's 45,000 vaccination posts were located in schools.

Legitimation by religious leaders

Perhaps the largest single group to be mobilized outside the health sector was the imams. As active support from the country's religious leaders was considered to be essential for the success of the campaign, the cooperation of the Directorate of Religious Affairs was sought. An official memorandum was issued calling on the support of all imams, and the directorate agreed to publish articles and sermons on the benefits of immunization in its monthly gazette, which has a circulation of 50,000.

A sermon was prepared for imams to preach simultaneously from all of the country's 54,000 mosques on the Friday evening before the start of the campaign. The sermon, based on the teachings of the Quran, including the quotation introducing this study, reminded the congregation that caring for their children's health was a religious and national duty, and strongly advised that to this end they should have their children immunized during the campaign. Messages were also included in religious broadcasts on radio and television, and imams continued to spread the message in house-to-house visits. Their involvement continued on the vaccination days, when at least 1,000 mosques were used as vaccination centres.

Support from other government departments

The General Directorate of Highways worked to keep all roads open during the campaign, especially in remote and mountainous regions. The Turkish army put its vehicles and communications facilities at the disposal of the campaign. The Ministry of Finance and Customs made arrangements to clear the hundreds of air and surface shipments of supplies and equipment imported for the campaign without delay.

Direct services from non-governmental organizations

NGOs and service organizations also offered their services free of charge at every stage and level of implementation of the campaign. The most significant contributions were provided by Rotary and the Red Crescent. The former provides a representative example of these contributions on a national scale.

Rotarians and their wives in 27 provinces contributed to the campaign. A total of almost 5,000 members from 60 clubs worked in coordination with health officials, providing transport, assistance in vaccination recording and promotional aid. Rotarians placed their own cars at the disposal of the campaign, as many parents needed transport to the vaccination sites, and in some areas the health services were short of fuel and vehicles for the distribution of vaccines. In some towns, up to 50 private vehicles were made available. And in one of the major volunteer efforts of the campaign, Rotary wives in Ankara prepared some 12,000 sandwich lunches for the vaccination workers so that the work could go on non-stop.

Individual contributions

By definition, social mobilization implies mobilizing not only the institutional and organizational sectors of society, but also the goodwill and support of every individual at community level. While it is obviously difficult to record the numerous goodwill actions of anonymous individuals at each stage of the campaign, the effort could not have succeeded without their crucial voluntary intervention when needed, from contributions of fuel in the event of local shortages to offers by coffee house proprietors for their premises to be transformed into vaccination posts, in order to avoid long queues building up when more children unexpectedly arrived for vaccination than forecast. Such contributions, which will forever remain anonymous, reflect the enthusiasm generated just as much as those of better-known individuals.

2. Manpower planning

Skilled medical and health personnel, for the most part attached to the MOHSA, carried out the technical planning of the campaign and the cold chain, monitoring and recording activities and vaccine site preparation. They also handled the actual administration of the vaccines. In these activities they were assisted by UNICEF and medical staff from Hacettepe University. WHO provided assistance in training key provincial medical and health personnel.

Motivation of the health sector to support and participate in the campaign was undertaken by the MOHSA. The minister of health sent periodic messages to all health officers involved.

A tiered training system

In Turkey, a central training team is responsible for periodic orientation of provincial medical personnel. In preparation for the campaign, the team participated in five special training sessions of two to three hours each. They then undertook the orientation of the provincial immunization coordinators and provincial directors of health services in organizational aspects of the campaign during three two-day centralized training programmes held in May 1985. All provincial immunization coordinators and the 250 provincial health supervisors responsible for the cold chain system also attended one-day seminars held in five centrally located cities in August 1985. The supervisors were regarded as crucial to the successful organization of the campaign in their provinces. The seminars, funded by UNICEF and guided by MOHSA, Hacettepe, WHO and UNICEF personnel, included technical and "hands on" sessions on how to use and maintain cold chain equipment, recording and reporting of vaccinations, intersectoral cooperation, and other managerial issues. Once these seminars were completed, the supervisors returned to their provinces to train the middle- and lower-level provincial and district personnel. A plan was designed, detailing the dates and subjects to be covered, and the supervisors were given video tapes of the seminars they had attended in order to assist in the follow-up training they themselves were to give.

All physicians working in hospitals, clinics and health stations attended provincial coordination meetings on the implementation of the campaign in their respective provinces, and the cooperation of private sector physicians was sought. Those participating actively in the campaign also attended two-day training meetings held at provincial centres. These physicians were then in turn responsible for training their own personnel. However, given the level of technical competence of the majority of the middle-level health personnel, little practical training was required; mainly, guidance was given in campaign organization.

Teachers, imams, *muhtars*, and other key local leaders were also briefed appropriately through a parallel orientation programme for non-health sector personnel.

Training materials

A manual on immunization was prepared for the campaign for distribution to all health personnel in provincial health directorates, health centres, and health houses.

Other materials on specific aspects of the campaign were distributed to provincial and district personnel, including a handbook on child health, a brochure on the immunization campaign, a series of slides, and video cassettes on various aspects of immunization and community health. These resources complemented the posters, brochures and video cassette programmes disseminated among the general public.

3. Supplies and logistics

The MOHSA and UNICEF worked together to order and import the necessary vaccines, equipment and supplies for the campaign from local and foreign suppliers.

Vaccines

Measles, DPT and polio vaccines were imported. Campaign requirements for DPT and polio vaccines were initially calculated on the basis of an assumed campaign requirement of 50% for the 13-60 month age group and 100% for infants. However, in order to allow for possible discrepancies between real and anticipated coverage levels at the local level, and in view of the fact that in certain provinces the decision was taken to disregard the previous vaccination histories of children in the target age group, 50% of the calculated requirement of DPT and polio vaccines for the entire campaign was distributed in time for the first round, to ensure a local reserve stock of around 17%. The high coverage rates attained in the first round necessitated the procurement of additional supplies of the vaccines for the second and third rounds. Requirements for the measles vaccine were calculated assuming no previous coverage for all children under 5 years of age. In the case of all vaccines, a margin of 30% wastage was calculated for.

Syringes

Some 18.5 million disposable syringes and needles, equivalent to 22 truck loads, were used in favour of the reusable type in view of the possible consequences of poor sterilization.

Cold chain equipment

Four additional container-type cold stores were imported to supplement the existing central vaccine storage during the campaign. These were afterwards transported for use in four of the provinces which had previously had shortfalls in vaccine storage capacity.

Additional ice-lining refrigerators and ice-pack and chest freezers were supplied to increase storage capacity at the provincial level. Any cases of equipment failure were reported on delivery, so that technicians could be called in to undertake the necessary repairs in time for the first round. The outreach of the health posts was also increased by importing 1,250 long-life cold boxes, which require no electricity or other energy input and are capable of keeping more than 2,000 doses of vaccine at unvarying temperatures for periods of up to 10 days.

Transport

The MOHSA created a full-time logistics unit to distribute supplies and equipment throughout the country. The arrival of the aircraft bringing the first shipment of imported vaccines into the country was extensively reported by the news media, greatly adding to the motivation of workers and volunteers involved in the campaign. On arrival in Ankara, the vaccines were stored in warehouses at Esenboga airport and the Refik Saydam Institute, while the cold chain units and other non-perishable items were either transported directly to the provinces or were stored at the Ministry of Health central warehouse ready for distribution on the scheduled dates.

Vaccines were distributed by road to the cold storage facilities in each of the 67 provinces during the final three weeks before the launch of the campaign. The vaccines were transported from the provincial centre to the subprovincial vaccination centres in cold boxes. One additional truck provided by UNICEF was added to the fleet of three already operated by the MOHSA to deliver vaccines to the provinces, and eight refrigerated trucks and drivers were loaned by the National Meat and Fish Establishment together with cold stores, which provided additional vaccine storage capacity for the duration of the campaign.

The provincial health director was responsible for assigning a driver and vehicle to each health centre. Where health centres did not already have their own vehicles, these were reassigned from the health directorate or other public organization or volunteer sources within the province. The provision and allocation of fuel for the campaign was coordinated by the MOHSA.

Requirements for each health centre were determined on the basis of the distance of every vaccination site from the centre multiplied by three (to cover the three rounds), added to the quantity needed for the phase preparatory to each campaign round (visits to determine the target population, distribute cold chain supplies, vaccines, syringes, etc.).

A child health passport

A new child health passport was designed. It was presented to the parents of all newly-vaccinated children, and replaced the vaccination cards of those children who had already been vaccinated through the routine programme. The pocket-sized, two-colour, six-panel document, bearing the slogan "An immunized child is a healthy child", provided the mother with a comprehensive health record of the child's vaccination history and other major health events in the first five years of its life. The passport also contained a growth chart and messages on oral rehydration therapy (ORT), breast-feeding, weaning, and birth spacing.

Five million passports (with protective plastic covers designed to ensure that the passports would last at least five years) were printed and distributed through the health centres and health houses to all mothers bringing their children on the vaccination days. The passports served to simplify evaluation studies and to enable follow-up after the campaign of children who were not fully immunized, as well as providing a support tool for ORT and other subsequent interventions.

Convergence of all forces on the vaccination process

Prior to the campaign, an extensive effort was made to ensure that all children under 5 years of age were identified and recorded on the basis of existing records or through house-to-house visits. This work was carried out by nurses, midwives, local health workers, *muhtars*, imams, and teachers. Children under 1 year old were recorded in a different colour for ease of identification. The forms were then used by the vaccination teams to record the date of administration of each vaccine and dose, and the records were kept at the vaccination sites to permit follow-up of drop-outs.

Vaccination teams

The teams were selected by the health centre physicians or other physicians designated by the health directorate in each province. They were composed of at least one health worker (nurse, midwife or other health sector employee) and a registration official (secretary, driver, schoolteacher or any other public servant). On the basis of the estimated target population in the area and an average vaccination time allowed of four minutes per child, with a limit of 100 children per centre per day, teams were organized and extra personnel needs were calculated to allow completion of each round within the specified 10-day period. Additional health personnel requirements were met either through reassignment of staff from hospitals or clinics, or from health centres, where the campaign rounds could be completed in a shorter time period. Team work forms were then drawn up, detailing the plan of activities for each team during the campaign. The visit schedules of the vaccination teams during the second and third rounds were the same as those of the first round, to ensure that at least one month elapsed between doses.

The vaccination process

Once the message of the campaign was familiar, the community leaders assisted local health personnel in briefing mothers on the vaccination dates, sites, and processes, to ensure that they attended with their children on the appointed days. On the vaccination days, mothers were directed to the 45,000 vaccination sites, which included health establishments, schools, mosques, business establishments and the homes of officials. Teachers, *muhtars* and imams helped with the organization of the vaccination sessions and assisted in recording activities. Streamlining techniques were used to ease the waiting period; secondary-level schoolchildren were called in to help keep mothers busy while they waited for their children to be vaccinated. An award system was used to commend mothers who had brought their children for vaccination in all three rounds of the campaign.

Monitoring

During the campaign rounds, each team summarized its work on a tally sheet showing the number of vaccinations performed daily, recorded by age group of the child (0-12 months and 13-60 months), vaccine type, and dose. At the end of each round, a summary vaccination report (one for each locality) was prepared, showing the number of vaccinations performed, again recorded by age group of the child, vaccine type and dose. In these reports, the coverage rate for measles at each vaccination site was immediately calculated to give an indication of achievement.

Once the summary vaccination reports were received by the health centres or districts, an area vaccination report was compiled and forwarded to the provincial level. The Postal Service set up a special telephone link in each province to allow campaign results to be relayed directly to the MOHSA during each round. In addition, a telephone network was set up in some provinces between groups of health centres to give rapid feedback to the provincial level. The results processed by MOHSA in Ankara were then publicized through the media on a daily basis.

Three indices were used in the general monitoring process, namely the coverage rate by type of vaccine and age group, the drop-out rate, and the rate of fully immunized children under 12 months old.

The campaign coordinator in each province was responsible for calculating the provincial coverage rates and monitoring the activities of the vaccination sites under his jurisdiction. At the end of each campaign round, the percentage of target children immunized in the area for each vaccine and each dose was calculated and recorded. A vaccination monitor chart was prepared, to demonstrate the percentage of the target population vaccinated in each round.

Financing the campaign

In general terms, campaigns are relatively inexpensive in view of the return on the investment. The cost of measles and polio vaccines, for example, are extremely low by comparison with the amount which would have to be spent on treating the diseases if not prevented by immunization. Furthermore, once the vaccine-preventable diseases are under control, considerable funds can be diverted in future from expensive curative facilities.

The Turkish campaign was organized as far as possible around the use of existing human and material resources and donations of time and supplies from individuals and organizations within the country, with the result that very little "new money" or donations from outside agencies had to be sought. The advantage of this approach is that the inputs into the campaign need not cease when it is over, but can be used to maintain its gains; the majority of the resources called on can be used subsequently in the routine immunization services, and in the case of support mobilized from outside the health sector, can also be extended to other PHC components.

The major initial expenditure for the campaign was on vaccines and cold chain supplies; fewer vaccines will be needed in the future as the backlog of unvaccinated children will have been dealt with during the campaign, and the cold chain supplies will become part of the permanent assets of the health service. As regards the support mobilized, there is no reason why it should not continue in future; the local government and religious leaders, teachers, service organizations and the media, for example, will always play an important part in the country's life, and their continued future support for similar initiatives will be of great value.

The estimated government contribution amounted to approximately US$ 25 million, which covered expenses such as transportation and personnel costs and electronic media. UNICEF provided about US$ 2.8 million, which included training and evaluation costs as well as the contribution of 39.5 million doses of vaccine and 18.5 million syringes and needles, together with thousands of items of cold chain equipment, including four cold rooms, 1,294 ice-lining refrigerators, 67 ice-pack freezers, 67 chest-freezers, 1,250 long-life cold boxes, one cold storage truck, and 6,500 vaccine carriers.

Many governmental and sectoral agencies and Rotary Clubs in most provinces made vehicles and fuel available, and financial and other support was received from the public and private sectors. A major pharmaceutical company based in Istanbul funded the production of the child health passports, and other companies donated the passports' protective plastic covers; Rotary International committed itself to a donation of US$ 2.1 million worth of polio vaccines over a five-year period, beginning with the campaign, and many other examples of such contributions could be quoted.

Discussion of results

Vaccine-eligible Turkish children under 5 years of age were immunized against diphtheria, pertussis, tetanus, polio, and measles between 11 September 1985 and 5 December 1985. According to aggregated reports received from the provinces, the total number of the unimmunized target population was 5,123,559. The number of 0-12 month-olds was set at 1,087,480; those 13-60 months old at 4,036,079. This number was the sum of children with no vaccination, and children with incomplete vaccination.

The coverage rates of DPT and polio for the first, second, and third rounds are shown in Table 1. Children who were not fully immunized before the campaign and received the shots to make them fully immunized were dropped from the target population: in each subsequent round, therefore, the target population decreased. It is noteworthy that with each round, the coverage rate was higher: the reverse has been true for campaigns in general. The high proportion of 0-12 month-olds vaccinated is also striking.

TABLE 1

Children immunized by DPT and polio vaccines and by age group Turkish national immunization campaign, 11 September - 5 December 1985

		First round			Second round			Third round		
Vaccines	**Age groups (months)**	Target population	Children vaccinated	%	Target population	Children vaccinated	%	Target population	Children vaccinated	%
DPT	0-12	1,087,480	880,237	80.9	1,072,647	870,837	81.2	1,030,954	845,662	82.0
	13-60	4,036,079	3,301,515	81.8	3,575,455	2,980,565	83.4	3,357,779	2,861,784	85.2
	0-60	5,123,559	4,181,752	81.6	4,677,652	3,880,063	82.9	4,388,733	3,707,446	84.5
Polio	0-12	1,087,480	866,345	79.7	1,072,647	869,137	81.0	1,030,954	846,908	82.1
	13-60	4,036,079	3,326,063	82.4	3,575,455	3,021,927	84.5	3,357,779	2,877,095	85.7
	0-60	5,123,559	4,192,408	81.8	4,677,652	3,891,064	83.2	4,388,733	3,724,003	84.9

The coverage rates for measles are 93.9% for 9-12 month-olds; and 83.4% for 9-60 month-olds (see Table 2).

TABLE 2

Children immunized by measles vaccine and by age group Turkish national immunization campaign, 11 September - 5 December 1985

Age groups (months)	Target population	Children vaccinated	%
9-12*	591,330	555,110	93.9
13-60	4,036,079	3,302,267	81.8
9-60	4,627,409	3,857,377	83.4

* The target population for this age group was obtained by taking 50% of the 0-12 month-olds in 1985.

The distribution of fully immunized children who had all three doses of DPT and polio, or the boosters of these vaccines, as well as measles vaccine during the three rounds, is shown in Table 3.

As is evident from Table 3, 11.2% of the target population (0-60 months) were fully immunized against DPT by the end of the first round. This number was increased to 3,937,002 children (76.8%) by the end of the third round.

Table 4 was designed to determine the immunization status of Turkey's 0-60 month-olds in 1985. The number of children under 5 years old was established at 6,849,144 (this was estimated from the cabled results of the 1985 National Population Census; it was assumed that the share of 0-60 month-olds is 13.3%).

Different pre-campaign coverage surveys indicated that the proportion of fully immunized children varied between 20 to 35%. If one assumes, based on this information, that the overall pre-campaign coverage rate was 25%, then the number who were fully immunized before the first round was 1,712,286.

If we add the number of children who were given their third doses or boosters during the campaign, to the number of

TABLE 3

Cumulative distribution of children administered third dose or booster shots, by vaccine and age group Turkish national immunization campaign, 11 September - 5 December 1985

			First round		Second round		Third round	
Vaccines	**Age groups (months)**	**Target population**	Children vaccinated	%	Children vaccinated	%	Children vaccinated	%
DPT	0-12	1,087,480	49,316	4.5	107,620	9.9	718,697	66.1
	13-60	4,036,079	525,866	13.0	750,918	18.6	3,218,305	79.7
	0-60	5,123,559	575,182	11.2	858,538	16.8	3,937,002	76.8
Polio	0-12	1,087,480	48,727	4.5	108,515	10.0	721,037	66.3
	13-60	4,036,079	546,784	13.5	779,498	19.3	3,259,835	80.8
	0-60	5,123,559	595,511	11.6	888,013	17.3	3,980,872	77.7
Measles	9-12*	591,330	320,063	54.1	452,152	76.5	555,110	93.9
	13-60	4,036,079	2,429,022	60.2	3,083,254	76.4	3,302,267	81.8
	9-60	4,627,409	2,749,085	59.4	3,535,406	76.4	3,857,377	83.4

* The target population of this age group was obtained by taking 50% of 0-12 month-olds in 1985.

TABLE 4

Coverage rates for DPT and polio vaccines, end 1985 Turkish national immunization campaign, 11 September - 5 December 1985

	DPT		Polio	
	Children immunized	%	Children immunized	%
0-60 month group				
a) pre-campaign immunized children*	1,712,286	25.0	1,712,286	25.0
b) boosters + 3 doses during the campaign	3,937,002	57.5	3,980,872	58.1
c) immunized children after the campaign (a + b)	5,649,288	82.5	5,693,158	83.1
d) 1 and 2 doses during the campaign	628,982	9.2	631,144	9.2
e) non-vaccinated children	570,874	8.3	524,842	7.7
f) 0-60 month-olds in 1985**	6,849,144	100.0	6,849,144	100.0

* 25% of Turkey's 0-60 month-old children were found before the campaign to have been vaccinated (results of the Hacettepe Institute of Population Studies Baseline Survey, Turkey, 1985).

** It is assumed that 0-60 month-old children constitute 13.3% of the total population.

children who were fully immunized before the campaign, the sum is 5,649,288 immunized children. This means that 82.5% of the country's children in the 0-60 month-olds stood as fully protected at the end of the third campaign round.

The number of children who had either their first or second doses during the third round—who, in other rounds, had not completed all the doses—was 628,982 (9.2%). A balance of 570,874 children (8.3%) were not vaccinated at all.

In short, by the end of the third campaign round, 91.7% of Turkish children under 5 years of age had been reached by the vaccines appropriate to their age groups. This in itself indicates that Turkey has already nearly reached universal child immunization, which is the 1990 world target.

The performance of provinces in each round shows a variation. Table 5 gives the distribution of the provinces by their coverage rates. While only 65.7% of the provinces were able to reach more than 81% of the target population in the first round, 79.1% were able to attain that level in the third round.

The national immunization status in general will be determined once again in March 1986, by a post-campaign survey by the HIPS. By May 1986, a WHO programme review and cluster survey of each of the 67 provinces in order to assess the routine immunization programme will be carried out.

TABLE 5

Distribution of DPT coverage rates, by province
Turkish national immunization campaign,
11 September - 5 December 1985

	First round		Second round		Third round	
Coverage rates	No. of provinces	% of provinces	No. of provinces	% of provinces	No. of provinces	% of provinces
1) -50	–	–	3	4.5	3	4.5
2) 51-60	3	4.5	2	3.0	3	4.5
3) 61-70	8	11.9	4	5.9	3	4.5
4) 71-80	12	17.9	6	9.0	5	7.4
5) 81-90	18	26.9	18	26.9	12	17.9
6) 91 +	26	38.8	34	50.7	41	61.2
Total	67	100.0	67	100.0	67	100.0

Long-term impact of the campaign

A preliminary analysis of the broader and more long-term impact of the campaign indicates that the campaign has been successful in achieving many of its aims.

The campaign approach has served to clear the backlog in immunization coverage of infants and young children, and while the high levels achieved in the target age group will need to be maintained, future efforts can subsequently be concentrated on raising the rates of tetanus toxoid administration to pregnant women and improving BCG coverage. Maintaining the coverage level achieved during the campaign is perfectly feasible, as the number of children to be reached in 1986 will be about 2 million, and thereafter as low as 1.5 million, approximately a third of the target aimed at during the 1985 campaign.

As the vertical campaign approach was avoided and the existing health services, which will be responsible for maintaining the gains achieved through the campaign, were directly involved in carrying it out, morale in the health sector is at a high level and the enthusiasm generated by the campaign can be built on further. Health personnel have benefited from the training received in the management and implementation of immunization programmes, and the experience they have gained will be a valuable asset in future programmes. In addition, more effective registration and reporting systems have been instituted, which will provide a basis for future intensive health care actions.

The close involvement of the health sector in the campaign was integrated with across-the-board involvement of all health-related sectors, improving intersectoral coordination and highlighting the essential contribution that the non-health sector can make to accelerated health care interventions. This approach has also shown the importance of creating a synergic effect in terms of campaign impact through cross-sectoral reinforcement of messages and activities.

The campaign has paved the way for the strengthening of other components of PHC. Achievement of high levels of coverage has served to attract the attention of the public, prove that infectious diseases affecting children are controllable, and generate national pride, thereby creating a climate conducive to success in other broad-scale child health interventions. Further actions are already planned; the problem of diarrhoeal dehydration will be the next to be addressed immediately after the campaign. An ORT promotion campaign is to be launched, and action is to follow against acute respiratory infections, which account for the highest proportion of child deaths in the country. The campaign can therefore be seen to have served as a crucial and unprecedented entry point, leading to sequenced actions across the whole child health front.

The campaign in Turkey has contributed to the realization that the United Nations goal of universal immunization by 1990 is indeed attainable, and the interest of a number of other developing countries has been aroused by the example the campaign has provided.

Reference

[1] E. Tunçbilek, S. Üner, S. Cerit, A. Hancioglu, T. Ünalan, M. Ulusoy, B. Akadli, I. Kulu, A. Toros, O. Ayhan, Report on the baseline survey for the 1985 Turkish National Immunization Campaign, *The Turkish Journal of Population Studies*, vol. 7, Hacettepe Institute of Population Studies, Ankara, 1985, pp. 5-26.

Sermon preached in all 54,000 mosques in Turkey on the evening of Friday, 6 September 1985, before the start of the immunization campaign

Esteemed Muslims,

The graces which God has bestowed upon people are numerous. To appreciate these fully and to be able to put them to the service of life is the most important duty of every Muslim. It is necessary to understand them and put them to proper use.

The Quran declares that humanity has been created in the most beautiful way. In one of the traditions, it is also said that when and if you rescue even only one person from the wrong path, this will be more beneficial to you than the entire world and everything therein.

How beautifully a poet has expressed this in saying:

"The child, who is said to be the smallest thing,
Is, in the world, perhaps the greatest thing."

The child is an important being in society; a guarantee of life and a hand stretched towards the future. It is well known that our Prophet (Peace be on Him) cared for all children, looked upon them with compassion, and commanded that measures be taken to protect them and ensure their healthy growth. Our beloved Prophet ordered us through another of His traditions to know the value of life before death comes, and of health before illness strikes.

Esteemed Muslims,

In order to reach the standards which our religion foresees, we must attach great importance to our children. In order to bring up a healthy generation and prevent the disabilities that diseases can cause, we must pay the necessary attention to them. We must carefully apply and obey the measures that medical science prescribes. Today, developments in the field of health care and immunization provide great opportunities for the welfare and health of children.

It is known that in our country the infant mortality rate is far too high. Whereas the infant mortality rate varies between 14 and 80‰ in neighbouring countries, this rate is in the range of 95‰ in Turkey.

It is remarkable that most of the diseases that cause infant deaths in our country are preventable by immunization.

With the aim of reducing the number of deaths of infants and providing our children with the means to grow more healthy, an intensified immunization campaign will be launched throughout the country, on Wednesday, 11 September 1985, in cooperation with UNICEF, WHO, and other international bodies, and DPT, polio and measles vaccines will be administered to millions of vulnerable children under the age of 5 years old. Whether this effort in social mobilization, which will constitute an example for many countries, will achieve its goal depends on your interest, support and contributions, esteemed brethren.

Esteemed Muslims.

To prepare our children for life and a healthy future is a religious obligation. Muslims cannot remain indifferent to these services that are being brought even to their doorstep for the benefit of their children. Our Prophet said that most men have not appreciated the value of the graces of health and free time. While pondering over the traditions of our Prophet and heeding His commandments we must understand the value of these graces which God has bestowed upon us.

The aim of the expanded and intensified immunization campaign is to vaccinate all young children and to immunize them against diphtheria, pertussis, tetanus, measles and polio and to prevent these diseases from afflicting them.

Every member of society who is aware of this fact must fulfil a religious and national duty and support this expanded and intensified immunization campaign, because those who will be protected and vaccinated against disease are our own children. All Muslims must contact the health authorities in their respective regions without fail, to participate in this effort. Everybody must take advantage of the immunization campaign being conducted by our Ministry of Health and encourage their neighbours to do likewise.

Let us not knowingly endanger our children who one day will be the embodiment of our religious and national values. Let us not leave them to be victims of the whims of disease, as though we were burying them alive as in the dark days of ignorance that preceded the revelations of our Prophet (Peace be on Him). Let us participate in this immunization campaign through which our children will be fortified and protected and not let any of our children down, lest we grieve their memory for the rest of our days.

Directorate of Religious Affairs

Case study

Vaccination Commando in Burkina Faso

The spearhead for accelerated EPI and PHC

Ministry of Health
Ouagadougou

UNICEF
Ouagadougou

On 4 August 1984, the revolutionary government took power in Burkina Faso, formerly known as Upper Volta. The new national authorities placed high priority on nation-wide immunization, and launched the "Vaccination Commando" operation, carried out between 25 November and 10 December 1984, which represented a major achievement in immunization coverage and established a milestone among low-income countries.

From its inception, the campaign was planned as the spearhead of an acceleration of the Expanded Programme on Immunization (EPI) and of primary health care (PHC), and its success has undoubtedly generated a high level of popular demand for health services in general and immunization in particular.

Burkina Faso is considered one of the poorest countries in the world. It has a total of approximately 7 million inhabitants; the capital, Ouagadougou, has a population of about 350,000, and the two next largest cities have populations of about 150,000 and 50,000 respectively. Outside these cities, the vast majority

Assignment Children, vol. no. 69/72, 1985

of the predominantly rural population is dispersed in some 7,000 villages, only around half of which are currently served by the health services. In 1984, the country numbered less than 200 doctors, nearly one-fourth of whom were foreigners. According to government figures published in 1985, the infant mortality rate (IMR) is 182‰, and the literacy rate 7.5%. Life expectancy at birth is 33 years in rural areas. Communications are very limited, and, in 1984, there were no nation-wide newspapers or television networks. Yet despite these obstacles, some 2 million children were immunized during the campaign against measles, meningitis and yellow fever.

The epidemiological situation prior to the introduction of EPI in 1980

Measles has always represented an extremely serious problem in Burkina Faso. The disease is so lethal that there is a local Mossi proverb which says: "Your child does not belong to you until he has had measles".

Burkina Faso was the first African country to use the measles vaccine, commencing with a mass immunization campaign initiated in 1962. Between 1962 and June 1978, 3,877,868 vaccinations were administered in the country, mainly during mass campaigns in 1963-1964 and 1968. On the whole, however, immunization had little impact on measles because the coverage achieved was limited. Even in urban areas, coverage was very low; for example, the proportion of at-risk children immunized in Ouagadougou was 18% in 1975-1976, 8.3% in 1976-1977 and 15% in 1977-1978.[1]

The introduction of EPI in 1980

EPI was introduced in 1980-1981, the goal being nation-wide coverage by 1990. The programme was to be implemented through health centres and mobile teams that carried the necessary cold chain equipment. It commenced in the cities of Bobo-Dioulasso in 1980 and Ouagadougou in 1981, and was continued in four provinces, with external assistance. Mobile teams were set up to administer catch-up immunizations, and the required doses of the EPI vaccines were administered to children of up to 1 year of age through existing vaccination centres (two in Bobo-Dioulasso and 10 in Ouagadougou).[1]

In December 1982, a simplified immunization schedule consisting of two vaccination sessions held six months apart was introduced in the province of Kaya with the assistance of the French *Association pour la promotion de la médecine préventive* (APMP), and was subsequently extended to two more provinces with the aid of the *Stichting Redt de Kinderen* (Dutch Save the Children Fund). Evaluation of the results in Kaya showed extremely high coverage. Of the target urban population, 92% received one dose and 80% received two doses of the DPT and polio vaccines; in rural areas the figures were 79% and 68% respectively. Measles and yellow fever vaccines were administered to 93% of the target population in urban areas and 88% in rural areas.[2]

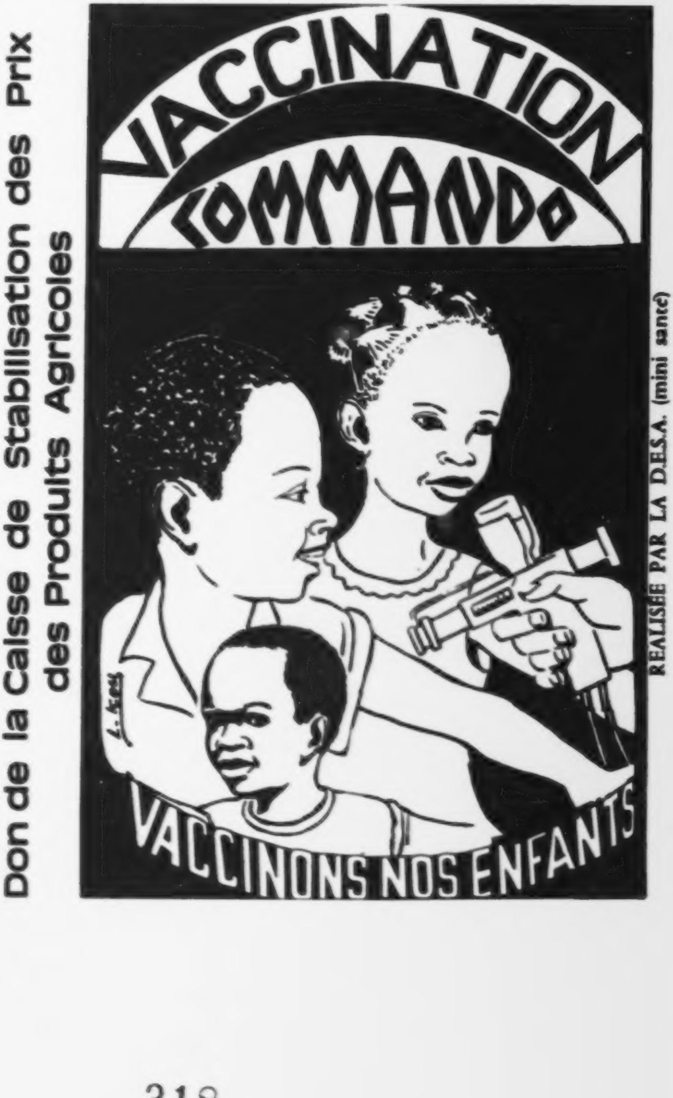
TABLE 1

Reported cases of communicable diseases
Burkina Faso, 1980-1984

Diseases	1980	1981	1982	1983	1984
Tuberculosis	879	624	1,011	548	877
Measles	13,713	17,327	20,940	21,324	30,094
Pertussis	3,888	3,144	3,214	3,586	—
Polio	145	128	119	142	—
Diphtheria	725	759	751	737	—
Yellow fever	0	0	0	356	17
Meningitis	1,857	4,229	6,800	6,286	15,811

Source: Burkina Faso, Ministère de la santé publique, *Rapport annuel 1984*, p. 69.

Depending on the strategy adopted, there were great differences between provinces, and equally great differences between rural and urban areas. Geographical coverage of EPI was approximately 10%, 5% of this figure having been achieved through health facilities and 95% through mobile teams. Table 1 shows the reported cases of communicable diseases from 1980 to 1984.


VACCINATION
COMMANDO
VACCINONS NOS ENFANTS
REALISEE PAR LA D.E.S.A. (mini sante)
Don de la Caisse de Stabilisation des Prix
des Produits Agricoles

The decision to organize Vaccination Commando

In line with the policy of social development of the National Council of the Revolution, the head of state in his speech of 2 October 1983 on the nation's future had already stressed the importance of an immunization policy for communicable diseases.[3]

In view of the slow expansion of EPI, in May 1984, the minister of health originally proposed organizing an immunization campaign from June to October of the same year.[4] During his visit to Burkina Faso in July 1984, James P. Grant, executive director of UNICEF, suggested that a delegation of health officials go the following month to study the experience of Colombia, where a national immunization campaign was underway, based on immunizing children on three national vaccination days set at monthly intervals (23 June, 28 July and 25 August 1984).

The Council of Ministers, meeting on 19 September 1984, subsequently resolved to hold the campaign from 25 November to 10 December 1984. The campaign was called "Vaccination Commando" to emphasize the fact that it was designed as a rapid, effective operation of short duration. The timing of the campaign was chosen for several reasons. By commencing the operation prior to the period when measles and meningitis outbreaks usually occur (December to May), it was hoped to prevent epidemics of those diseases. Holding it after the rainy season would facilitate access to villages and, in December, villagers would not be out working in the fields and children would be in school.

It was originally intended that all the vaccines usually included in EPI should be administered during the campaign, but this would have been difficult in view of the short preparation time envisaged. The BCG vaccine was excluded after a pilot test highlighted the technical difficulties associated with its administration. It was eventually decided to focus on easily administered single-dose vaccines against three priority diseases: measles, yellow fever and meningitis. A combined measles-yellow fever vaccine was introduced on a partial basis for the campaign.

The intention of the government was to reach the highest possible proportion of the at-risk population, and the age of the target groups selected for the three vaccines was higher than usual EPI norms. The measles vaccine was to be administered to all children aged 9 months to 6 years, and the yellow fever and meningitis vaccines to all children aged 1 to 14 years. The campaign was designed to achieve universal coverage, even at the possible cost of administering some unnecessary vaccinations.

Objectives of the campaign

The major objectives assigned to the campaign were:

a) to avert future epidemics, as the country had recently suffered from serious outbreaks of measles, as well as yellow fever, which had been unknown since 1969 but had reappeared in 1983 with 356 cases reported;

b) to accelerate EPI through the vaccination campaign, as EPI coverage was limited in terms of both geographical outreach and the number of children fully immunized, and had had little impact on morbidity rates.

The purpose of Vaccination Commando was to serve as a catch-up operation in order to allow EPI to be focused only on immunizing newborn children. At the same time, the campaign was designed, through a process of social mobilization, to create awareness by the population of the need to immunize all their children, a prerequisite for the acceleration of the existing EPI. To that effect, further subgoals were assigned to Vaccination Commando: to take a census of the target child population, to distribute vaccination cards throughout the country during the campaign, and to obtain the commitment and participation of all political and administrative authorities.

Mobilization of political support

Three key aspects of the decision-making process played a vital part in maintaining political support for the campaign.

1) Vaccination Commando had the direct personal support of the head of state, and the decision by the Council of

Ministers to undertake the campaign was transmitted directly to top administrators in each ministry concerned.

2) An intersectoral approach was promoted from the outset, and put into practice through the creation of vaccination committees operating at all levels of governmemt.

3) The Committees for the Defence of the Revolution (CDRs), which replaced the previous political structures at all levels of government, assumed responsibility for making the campaign work, and it was the direct involvement of the national political system in all phases of the campaign which ensured that mass participation was generated and the necessary resources obtained.

These factors contributed towards overcoming widespread resistance to the idea of the campaign. Certain doubts had been voiced by some Ministry of Health officials, donors and other organizations as to the advisability of the campaign approach and the feasibility of the undertaking, but the evident intention of the government to carry the plan through and its confidence in its ultimate success provided the necessary momentum and was sufficient to enlist the participation of all.

Organization of Vaccination Commando

The health sector, while not officially charged with coordinating campaign resources, was closely involved in the process, because the National Vaccination Committee (NVC) was led by a high-level Ministry of Health official and it was through the existing health structures that the campaign was to be implemented. The major need was to ensure the availability of trained workers to give vaccinations, and to organize all technical resources. These were seconded from their regular duties for the period of the campaign, and equipment was made available from a wide range of sources.

UNICEF also played an important part in planning and resource mobilization at the national level, helping to determine needs, identify sources and arrange logistics.

The NVC provided central direction for the campaign by drawing up plans, organizing support, and coordinating resources. It was the focal point for effective cooperation between many governmental and non-governmental participants. Yet Vaccination Commando could not have been implemented without significant decentralization to provincial, district and village levels, where most of the day-to-day work took place and where solutions had to be found to the operational problems that arose. The CDRs, with their broad responsibilities and extensive network, were the key to this process in terms of both planning and implementation.

The organizational structure

The organizational structure adopted was selected to take account of three major constraints:

1) the very short period of preparation for the campaign (two months);

2) the lack of financial resources of the government (the national budget for 1985 was 69,600 million francs CFA);

3) the inadequate road and telecommunications infrastructure and very limited geographical outreach by the mass media (newspapers, radio and television).

The four-tier committee structure set up specifically for the campaign, based on decentralization to the provinces and districts and on community participation, comprised at the central level the NVC supported by the Technical Committee for Direct Sensitization, then provincial and district committees, and finally, the village and urban neighbourhood committees.

1. The National Vaccination Committee (NVC)

The NVC was an interministerial group set up for the campaign, directly responsible to the government for the implementation of Vaccination Commando. It was chaired by the director of public health. In addition to the director of EPI, it was composed of delegates from the National General Secretariat of the CDRs and from the following ministries: Family Development and National Solidarity; Defence and War Veterans; Education; Information and Culture; Interior and Security; Agriculture and Livestock. Other organizations such as UNICEF, SPONG (the NGO Secretariat), WHO and the Burkinabè Red Cross were also involved.[5] The NVC held twice-weekly meetings during the campaign and the two months that preceded it. The responsibilities of the NVC were:

- to define the main objectives of the operation;
- to identify the means to be mobilized and the available resources and seek the financial and logistical means needed to meet shortages;
- to define the role of the provincial, municipal and district committees. To this end, the NVC instructed the high commissioners (provincial administrative authorities), the CDRs and provincial health directors to set up provincial committees;
- to develop a data collection system;
- to coordinate all preparatory activities. For this purpose, a tour of inspection of all provinces was made by the NVC with the assistance of UNICEF and APMP to identify last-minute problems;
- to plan the campaign and supervise its implementation;
- to evaluate the impact of the operation.

2. *The Technical Committee for Direct Sensitization*

This committee, an off-shoot of the NVC, was composed of teachers and audiovisual technicians from the Department of Health Education, the National School of Public Health, the Ministry of Family Development and National Solidarity, the National Adult Functional Literacy Institute, the Department of Cultural Affairs, the National Agriculture Extension Service, UNICEF, the National General Secretariat of the CDRs, the Burkinabè Broadcasting Service and the Studies and Liaison Office (BEL).[3]

The committee was responsible at the central level for devising educational messages and mobilization slogans and for designing, producing and distributing visual and written materials in the provinces.

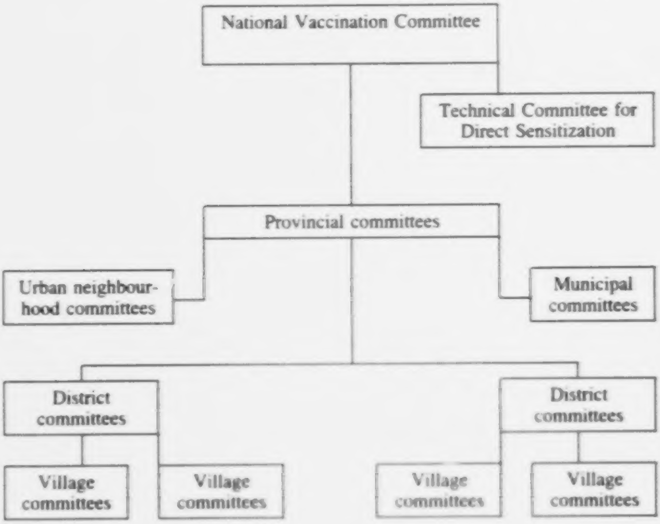

National Vaccination Committee
Technical Committee for Direct Sensitization
Provincial committees
Urban neighbourhood committees
Municipal committees
District committees
District committees
Village committees
Village committees
Village committees
Village committees

Fig. 1: Organization chart

3. *Provincial committees*

The provincial vaccination committees were responsible for the implementation of the operation. The selection of provincial committee members was guided by concern for good planning and efficiency. Members included the high commissioner, the provincial health director, CDR delegates and other designated members, as well as representatives of designated agencies able to sensitize and mobilize the population and provide logistical support (Ministry of Family Development and National Solidarity, Inspectorate of Primary Schools, NGOs, the armed forces, the police, etc.).[5]

The role of the provincial committees was to plan the campaign at the provincial level, recommend solutions to any difficulties to the NVC, mobilize the population, coordinate the preparation work of the district and village committees, supervise the progress of the campaign, and report on the situation to the NVC.

4. *District committees*

The membership of these committees comprised the prefect, the health worker from the district capital, district CDR delegates and coopted members; they kept count of vaccination posts and teams.[5]

5. *Urban neighbourhood and village committees*

These committees were composed mainly of members of the local CDR. The CDRs must take a great part of the credit for the success of the campaign; it was through them that a direct channel of communication to every community was provided and all fund-raising and sensitizing activities were organized (censuses, sale of vaccination cards, distribution of posters, etc.). Their work was facilitated by the fact that they were already established in every village, urban neighbourhood and workplace, where they had replaced traditional village leaders.[3]

It was the village committees which undertook most of the work at community level, namely:

- the sensitization and mobilization of communities;
- the census of children to be immunized;
- the sale of vaccination cards;
- the maintenance of order during vaccination sessions and the channelling towards the registration tables.

Preparation and implementation of the system

The campaign was prepared and implemented in the following stages:

1) census of the target population to be immunized and sale of vaccination cards through the CDRs;

2) assessment of needs and available resources (staff, vaccines, freezers, refrigerators, cold boxes, cars, fuel, inoculation material, etc.) by the provincial health directors;

3) mobilization of resources;
4) setting up of the vaccination teams (on average three per province) and of the cold chain, and preparing of schedule of visits;
5) training of two trainers per province in Ouagadougou and training of vaccinators in the provinces;
6) design of a standard checklist at the central level;
7) inspection visits in the provinces by the NVC and in the districts by the provincial committees;
8) sensitization and mobilization of the population by the CDRs.

The cold chain

The cold chain was a major concern, as the existing system required substantial upgrading to serve the needs of the campaign. The only full-size cold store in the country, where vaccines could be received and stored ready for distribution directly to the provinces via refrigerated trucks and aircraft, was in Ouagadougou. However, similar cold stores were needed to serve as vaccine depots in the west, south and north. A new cold store established by UNICEF in Bobo-Dioulasso served Houet and surrounding provinces; this was the first step in the planned development of regional cold stores for the national EPI. For the campaign, refrigerators were made available in the operational bases of every province, the clinics and other health posts, from which the mobile teams would take the vaccines out in trucks equipped with cold boxes.

Transport

Vehicles, particularly trucks, were needed to transfer vaccines and other materials from Ouagadougou out to the provinces and for the use of each vaccination team. Given the two-month lead-time for these arrangements, scheduling and preparations relied largely on the military experience of the government. Detailed lists and maps were made of each province and the country as a whole, and the distances between the cities, towns and villages calculated. Vehicle and fuel requirements and vaccination supply schedules were then determined. Possible sources of vehicles for use in the campaign were identified, and appropriate arrangements were made by the vaccination committees.

Vaccines and other supplies

Adequate amounts of vaccines needed to be obtained, chiefly through the national government, and distributed to the provinces in time for the campaign. The amounts needed were calculated on the basis of detailed lists of the estimated number of eligible children in each town and village of every province, prepared and submitted by the provincial health departments. Only a small proportion of the total quantities required were on hand, and the Ministry of Health began to purchase vaccines on the world market. Later, large quantities of vaccine were donated.

Immunization supplies and equipment likewise had to be obtained to supplement what stocks existed locally in the provinces. The chief requirement was for jet injectors, used in preference to syringes where possible; while pedojets had been used by the Ministry of Health for some 20 years (and imojets more recently), the number available was not sufficient to equip the 90 or so teams that were planned, and many injectors were not functioning. Syringes, needles, sterilizers, and other materials were also needed, and provincial staff prepared lists of what would be required for the campaign.

Manpower

Manpower requirements were based on data furnished by the provinces, which were used to identify staff available and to determine further personnel and training requirements. An average of three teams with one or more back-ups were to be used in each province, staffed with existing health personnel. The use of mobile teams to cover entire provinces minimized the total number of personnel needed (although these had to work intensively). Each team was to be made up of at least three, and up to five or six persons (who were generally male). The team included a doctor or other senior health worker as leader, at least one other experienced vaccinator, and other staff who would manage the vaccines, keep equipment in good repair, deal with other problems, and drive the vehicle. The actual size of the teams was left up to the provinces, depending on needs and manpower availability. It was originally anticipated that trainee health workers would be involved in the campaign, but in most instances they were not needed, as sufficient staff were obtained for the three-week period from other parts of the provincial health services.

Training

There was only minimal need for training of workers, since the vaccinations were to be carried out by health staff who were already familiar with immunization. At the same time, most were not actively involved in EPI but worked in health centres, and few had experience of campaign-style operations. A three-day refresher course on jet injector and cold chain operation was given in Ouagadougou by APMP technicians. The course was designed for two persons per province, but in view of the limited lead-time attendance was not as high as expected. Most of the essential training, particularly in the use of the pedojet and its maintenance, was conducted in the provincial centres by existing staff, and manuals were printed and distributed by UNICEF for this purpose. Training in registration and recording was given on the spot to the local CDR by health staff.

The immunization process

The predominantly mobile strategy to immunization which was already in use was maintained: from the operational bases in the provinces or health centres, mobile teams carrying vaccines and cold chain equipment would visit pre-designated sites in towns and villages where mothers and children were gathered. The minimum population of the villages visited was about 300.

The teams went out each day from the provincial bases, except when they had to visit the more remote areas, where they often stayed for several days. Schedules were arranged in advance and announced by radio or other means to the local CDR or prefect. Mothers and children were assembled at town or village centres, or at health centres where these existed. If vaccination cards had not been purchased beforehand they could be obtained at the vaccination post. Parents and children were directed to registration tables by CDR members, the cards were stamped and the children were then taken to the appropriate queue for the vaccines they needed to receive.

The exact means by which vaccinations were administered varied among provinces and teams; nearly all teams relied on at least one jet injector, as these were much faster and required less attention to sterilization than syringes. The injectors often broke down, however, and syringes were used while they were being repaired. A CDR member or other local person stamped the child's card and recorded each vaccination on a sheet. The system as a whole was effective, although some aspects of control obviously could not always be assured.

Difficulties related to the high demand for immunization

In many areas, particularly in the more remote provinces, temporary shortages of vaccines, supplies and fuel were experienced. This was due to the high level of demand placed on local systems and the difficulty of predicting the level of coverage that would be achieved. The central authorities resupplied the provinces as necessary with vaccines and other materials where shortages became critical during the campaign. Most of the solutions were local, however: teams rotated their schedules and obtained fuel and other supplies from local sources, often in the villages where they were working. There was a high demand for immunization, and it was generally the case that as many teams were active as there were trucks and supplies for them to use.

The fact that a large number of those who received vaccinations were not in the designated target groups added to the logistical difficulties. Particularly at the beginning of the campaign, public announcements said that "all citizens" or "all children from birth to 14 years old" would be fully immunized. It is in any case difficult to determine age precisely, and the CDRs in their enthusiasm sometimes gathered entire villages for immunization so as to ensure coverage. This presented a dilemma for vaccinators, who could not easily refuse someone who expected to be vaccinated, despite guidelines that defined target groups. Another aspect of this problem was the replacement of old vaccination cards with new ones in the registration drive, with the result that it could not always be determined whether a child had been previously immunized. Once this situation came to the attention of the NVC, directives were issued to the CDRs and to health workers to ensure that only children within the target age groups were vaccinated, and they were asked to make efforts to verify vaccination histories. Some unnecessary vaccinations still unavoidably occurred, but overall, the problem was overcome in this way.

Difficulties in keeping to the schedule

Supply shortages, unanticipated demand and equipment breakdowns predictably led to delays in the campaign. Vaccination sessions in villages tended to take longer than expected, particularly when a jet injector broke down and it became necessary to administer vaccines by syringe. This caused delays in reaching subsequent villages, which led to some frustration when everyone had been gathered in vain. Such difficulties led to the official concluding date being overrun in some provinces. There was little that could be done; people were reconvened as necessary, and strong encouragement was given to the team to maintain the announced schedule. Teams frequently worked far into the night to complete their schedules.

Monitoring

The monitoring procedures for Vaccination Commando were severely constrained by the pressures of the campaign. Two categories of monitoring data, those concerning logistics and population coverage, were important.

- Scheduling and the management of vaccines, supplies and equipment were carried out at the provincial level by EPI or other health staff. Each team made a daily report on mileage, numbers immunized, consumption of vaccines and supplies and condition of equipment; preparations were then made for the next day's operations and any necessary repairs carried out. Serious problems, especially concerning vaccine supply, were reported via telephone or the official radio network (TLO) to Ouagadougou. Vaccine wastage was minimal, due to the intensive nature of the services.
- The number of doses administered of each vaccine was also reported by each team, and a daily summary was prepared at the provincial level. These were in turn transmitted by telephone or TLO to Ouagadougou, where national summaries were made and then publicized by radio, newspapers and television. This system, including estimation of coverage levels, provided an overall view of campaign progress and introduced an element of competition between provinces.

Communications

Sensitization and mobilization of the people

This was the most spectacular aspect of the operation, as shown by the numbers of children immunized.[3]

In order to carry out Vaccination Commando it was necessary to motivate, educate, mobilize and inform a population that was largely illiterate and located in dispersed villages not easily accessible by road, and sometimes beyond the reach of the press and radio. There was early and continuing recognition of the importance of a coordinated and intensive approach to communication activities within the campaign. The strategy adopted was based on local, person-to-person contact, simple thematic messages and the use of theatre. This aspect of the campaign extended through all of its phases—planning, resource mobilization, execution, and follow-up.

The broadly-based mobilization of local resources and community participation achieved during the Vaccination Commando operation was the consequence of sustained attention to the aspect of communications. A variety of effective means of communication between the government, the health system and the population were used.

Responsibility for communication activities

At the central level, the Technical Committee for Direct Sensitization was responsible for planning the various sensitization and mobilization activities carried out throughout the country.

The provincial committees were also very active with regard to sensitization: they took the initiative in organizing meetings, folk evenings and theatre shows to mobilize the population, and covered the travelling expenses involved.

The CDRs carried out the day-to-day work in the communities; this was linked to their distribution of vaccination cards (sold at a discounted rate of 10 francs CFA each) and fund-raising activities. Local women's groups also played a prominent role in this process.

The message

Immunization was presented to the public through several mutually reinforcing messages: that it protects the family and is part of the mother's duty to her children; that it builds a strong country; and that it will make children "as strong as a Commando". These messages were used to raise awareness of and to create a demand for immunization, to encourage participation, to provide continuity in information about the campaign, and as a basis for educational materials.

Communication activities

The Technical Committee for Direct Sensitization initiated a number of activities, notably "theatre forum" performances, extensively used in spreading the message. The theatre forum is a participatory form of drama, popular in African countries. For the campaign, sensitization and education were achieved through the performance in the national languages of a tragicomic caricature of attitudes to immunization and their consequences. The performance took the form of an open forum in which members of the audience became actors. After the play, they identified the major problems raised and replayed the scenes incorporating the proposed solutions.

Other activities arranged by the committee included:

- dances, cultural evenings and football matches aimed at raising funds for the committee's activities and for inspection tours;
- songs and poems for children, parents and the community in general, broadcast in the national languages;
- a video documentary on the operation in the province of Boulkiemdé, made in cooperation with the national television;
- a sensitization section to be included in the training module for immunization trainers;
- conferences on immunization given by health personnel in urban and rural areas in the national languages.

The committee also designed, produced and distributed a wide range of materials:

- 55,000 educational posters and 60,000 stickers on the campaign were printed and displayed in public places all over the country (bars, medical centres, administrative buildings, schools, etc.);
- leaflets were prepared for the use of the CDRs and vaccinators, explaining what diseases can be prevented by immunization and giving the corresponding vaccination schedules;
- sensitization guides containing key messages designed to respond to mothers' concerns were prepared for the use of the CDRs and health workers and pre-tested with mothers;
- billboards explaining the necessity for immunization were posted along the main roads;
- educational slogans were devised for transmission by radio and in the press;
- broadsheets on Vaccination Commando were prepared to serve as information aids for teachers, veterinary surgeons

and extension workers in rural areas, who were expected in turn to inform, sensitize and mobilize other members of their communities.

Radio

Parallel to these activities, the radio played an important role in broadcasting items relating to the campaign, including:

- announcements and information for the provinces;
- news broadcasts in the national languages;
- reports by regional correspondents on local sensitization activities and the results of the immunization campaign;
- schools broadcasts;
- interviews with the health authorities;
- a popular song for children.

Costs

The chief concern in making a cost analysis of a campaign such as this is to determine the value of the various categories of financial and other contributions, by different sources of funding. Ministry of Health figures published shortly after Vaccination Commando offer a relatively complete account of the direct costs involved, showing the general magnitude of overall financial outlays and the distribution of costs by category.

The national government contributed some 48% of the total amount of US$ 841,000, while the remaining 52% came from international and other national sources. Vaccines accounted for 70% of total costs (US$ 587,000), cold chain and injection materials for 19% (US$ 162,000), fuel and transport for 3% (US$ 27,000), registration and communication materials for 6% (US$ 53,000), and cash (mostly for per diems) and miscellaneous items for 1 to 2% (US$ 12,000). These figures are only approximations, but they provide a reasonable indication of the cost pattern at the national level. Contributions at the provincial, district and local levels, particularly for vaccines, publicity and fuel, are not included in these figures; it is estimated that these items reached at least an additional 20% of total costs. In addition, many financial and in-kind contributions were received from individuals and local donors, as well as inputs of a non-quantifiable or already-paid-for nature from various sources.

Opportunity costs, rather than the direct costs, should be considered with regard to other types of inputs provided for the campaign. Numerous persons were partly or fully employed —of the order of 1,000 or more working full-time—for three to six weeks. Many regular activities were postponed during the campaign or carried out at evenings or weekends; overall there was no significant loss of production.

The drive to obtain support for Vaccination Commando generated a remarkable level of material, financial and human resources. In terms of real opportunity costs, this strategy led to an immunization effort that must be judged quite cost-effective given the short duration of the campaign. High returns can clearly be obtained from expressed national commitment. Much of the equipment used for the campaign may be carried over to routine services, which will have to face an increased demand for immunization.

Achievements

Population coverage

The Research, Planning and Statistics Department of the Ministry of Health carried out a stratified cluster-sample evaluation of campaign coverage in March and April 1985, presenting the results in April.[6] The study focused only on children in the most vulnerable age groups (12-23 months and 24-59 months), although the target populations of Vaccination Commando included children up to the age of 14. However, the results allow estimates to be made of total population coverage.

Some 5.9 million doses of vaccine were administered during the campaign (20% measles, 36% yellow fever, and 44% meningitis). As already mentioned, however, many of those immunized fell outside the target populations of the campaign.

This led to a probable overstatement of campaign coverage (90 to 106%) in the initial report. Based on the findings of the Ministry of Health study, an estimated 2 million children in the target populations received at least one vaccination (73% of the total), including 0.7 million against measles, 1.6 million against yellow fever and 1.7 million against meningitis. About 90% of the vaccinations were given in rural areas, and 10% in urban areas. The differences between the yellow fever and meningitis figures were chiefly due to local vaccine shortages and the fact that a higher number of the target population had been previously immunized against yellow fever.

Overall, an estimated 19% of the national target population had already been immunized against measles, and an additional 56% were reached by Vaccination Commando. The campaign reached some 62% of the target population for yellow fever in addition to 15% already immunized, and for meningitis it reached about 66% in addition to 11% already immunized. Thus, 75% or more of the total target populations for the three diseases were reached by the campaign.

Of the eligible populations for each vaccine (i.e., all those who had not reported previous vaccinations), coverage rates were approximately 68% for measles, 73% for yellow fever and 75% for meningitis. Of the overall target population not previously immunized against all three diseases, 79% was reached by the campaign.

Survey results showed that approximately 36% of the children experienced some reaction to vaccines they received, but few if any of these cases required further medical attention.

A seroconversion study to determine immunization effectiveness was begun in May 1985 by the Organization for Co-ordination and Co-operation in the Control of Endemic Diseases. The results are not yet available; however, the findings are expected to show that some 50 to 60% of children immunized have received full protection as a result of the campaign.

There is evidence that significant morbidity and mortality were averted by the campaign. A very high incidence of measles was reported for early 1985 in Yatenga Province, but it only affected unimmunized children, indicating that a major epidemic might otherwise have occurred. For the country as a whole, Ministry of Health epidemiologists estimate that some 350,000 to 500,000 cases of measles may have been prevented among children aged 9 months to 6 years.

An increased awareness

The communication activities conducted for Vaccination Commando were also evaluated in March 1985 with UNICEF support. The results of this survey indicated that considerable awareness of the purpose of and need for immunization had been created (87% of respondents were aware of further immunization needs). The most frequently cited source of information on Vaccination Commando (55% of the respondents) was the CDRs. Health workers were the second source (34%), while the radio was mentioned by 16% of the sample.[7]

As a direct result of the campaign, immunization has become far more understandable to and accepted by the people. Demand has been created for further immunization under EPI, and it can be expected that this new awareness will also generate demand for other health services.

Enhanced morale and increased material resources

A substantial amount of supplies and equipment were provided to the country. Among the material received from donors were some 40 jet injectors, with spare parts, and cold chain equipment (including two freezers and 70 cold boxes). Some training was also given to health personnel.

Provincial health directors have become more fully involved in immunization activities. Health worker morale at all levels appears to have been boosted by the campaign. Donors have markedly increased their attention to EPI and their commitments to its support.

Burkina Faso has received international recognition for the campaign. Neighbouring countries are familiar with Vaccination Commando, through radio broadcasts and other publicity.

Vaccination Commando, the spearhead for accelerated EPI and PHC

Rapid expansion of EPI

As a continuation of Vaccination Commando, a number of steps have been taken in support of expanded immunization and primary health care activities in Burkina Faso, indicating that the momentum of the campaign and the coordination achieved during it represent more than merely short-term successes. The government has made EPI a priority as part of its overall PHC effort, and is highlighting EPI in its current five-year plan.

The Vaccination Commando operation terminated on 10 December 1984, and the final Ministry of Health report on the campaign was circulated in February 1985. An EPI consultative conference was held in Ouahigouya on 15-16 February 1985, when key Ministry of Health officials met with representatives of all agencies and organizations involved in immunization activities in the country.

A second consultative conference on EPI was held on 12-13 April 1985 in Bobo-Dioulasso, when ministry officials again met with representatives of major donor groups and non-governmental organizations concerned with EPI.[8]

EPI action plans—both short-term (1985-1986) and longer-term (1985-1989)—were reviewed. It was decided to proceed with progressive implementation of EPI as quickly as possible, following a "catch-up" phase for children under 6 years of age who were not yet immunized against EPI diseases. It was also agreed that during the catch-up phase all children up to 3 years of age should be immunized against tuberculosis and polio, all children between 2 months and 6 years old against diphtheria, pertussis and tetanus, all children between 9 months and 6 years old against measles and yellow fever, and all pregnant women against tetanus. Routine immunization was to cover the same diseases, with all children up to 2 years of age being immunized against tuberculosis and polio, those between 2 months and 2 years old against diphtheria, pertussis and tetanus, those between 9 months and 2 years old against measles and yellow fever, and all pregnant women against tetanus.

Donors gave preliminary indications of their support for activities in different provinces. The integration of immunization with maternal and child health and PHC programmes was stressed, and it was recommended that twice-yearly EPI coordinating meetings be held.

An EPI technical review was held on 6-10 May 1985, when representatives of those involved in EPI, donor groups and other concerned organizations reviewed EPI plans and made recommendations in a number of areas, including immunization schedules, vaccine standardization, surveillance and evaluation procedures and epidemiological control procedures. No final decisions were taken, but a basic consensus was reached.[9]

A mixed strategy using both fixed centres and mobile teams is to be adopted, with light mobile teams radiating to villages over a distance of up to 10 to 15 km. Programmes will be drawn up on a provincial basis. Both the simplified schedule requiring only two administrations (using the attenuated polio vaccine) at six-month intervals and the standard schedule of three administrations will be used. In any one province the same types of vaccines and same schedule must be retained.

Accelerating PHC nation-wide

The government places high priority on extending its village-based PHC programme nation-wide, and as a continuation of the Vaccination Commando operation aims to extend PHC throughout the country under the "One village, one health post" scheme. A mass campaign to mobilize commitment and resources is planned, the goal being to achieve total coverage of the country during 1986.[10] This means reinforcing existing PHC centres and establishing new health posts in each of the remaining 3,000 to 4,000 of the 7,000 villages in the country.

Back-up and supervision are recognized as serious problems, but the government is confident that an expanded peripheral health structure can be developed through the mobilization of the population. Administrative support will also be channelled through village committees and linked to the CDRs.

At village level, health posts are to be staffed by volunteer health workers appointed by the village committees and supported by the community. The volunteers are to be supervised by the staff of the Health and Social Welfare Centre. Each primary health post is to have two community health workers: a village health worker and a traditional birth attendant. The latter will be in charge of antenatal care and deliveries, while the former will be responsible for malaria, conjunctivitis, cuts and wounds, diarrhoea, minor fevers and sanitation. However, their most important role will lie in sensitization of the community and the promotion of new practices in nutrition and hygiene. All village-level workers are to be remunerated by the village, and the Ministry of Health will provide only training and supervision. As far as EPI is concerned, the role of the staff of the village health posts will be to identify children eligible for immunization and provide information and motivation to the village population.

The next level, the Health and Social Welfare Centre, will be the first referral level. Here, qualified personnel will be responsible for performing vaccinations on fixed premises and for the surveillance of selected communicable diseases. The centre will act as a supply and operations base for the mobile teams, and provide training and supervision as well as some curative measures. Each will cover a radius of about 15 to 20 km. Some 400 centres will each supervise eight to 10 village teams covering a population of 15,000 to 20,000 and will be backed up by the 59 existing medical centres that represent the next level.

The Provincial Health Department in each of the country's 30 provinces will be responsible for distributing drugs and supplies, surveillance of communicable diseases and supervising and arranging refresher courses for department staff. By 1990, it is expected that there will be 10 provincial hospitals located in provincial capitals. These represent the next level of referral after the medical centres. The last level is composed of the two national hospitals in Ouagadougou and Bobo-Dioulasso, which provide specialized health care.

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Case study

Simplifying immunization schedules in West Africa

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Simplifying an immunization schedule primarily involves a reduction in the number of contacts necessary to achieve the protection of infants. In order to increase immunization coverage, a simplified schedule is particularly useful in countries with dispersed populations and limited health services in rural areas. By spacing the sessions at six-month intervals, vaccinations do not need to be administered during the rainy season when most roads are flooded and many families move away from their homes to work in the fields. A further advantage is that cost savings may be achieved by reducing the number of vaccination sessions. These advantages outweigh the disadvantage of longer intervals between sessions.

However, if the regular EPI schedule is to be reduced, vaccines must be used which can provide full protection after only two doses. The types of vaccines that are suitable for use in a two-session programme are discussed as well as their combinations. The simplified immunization schedule has been implemented in some West African countries since 1980, using mobile vaccination teams comprised of a staff of four: usually, a qualified male nurse as team leader, a traditional birth attendant, a driver and an assistant. All are trained in using the jet injector. The cost per fully immunized child for seven vaccines, as yellow fever vaccine is included, are detailed for the Kolda region in Senegal and the Kaya region in Burkina Faso. In the latter this cost amounted to under US$ 3.50.

Assignment Children, vol. no. 69/72, 1985

A number of different strategies exist to expand immunization coverage rapidly on a nation-wide basis. The choice of a given strategy will depend on local epidemiological, cultural and socio-economic conditions and on political will. In the strategy proposed, an immunization programme should normally present the following characteristics.

The programme must be feasible, namely designed in terms of schedule and equipment so that it can be implemented without too many difficulties by the country concerned. The cost must fall within the limits of local resources, supplemented by such additional resources as can be mobilized from external sources for a number of years. The programme must be safe and visibly effective in reducing morbidity and mortality rates. The strategy should be evolutionary, so that the programme can later be combined with other services available to all population groups. An essential feature of the programme should be complementarity rather than competition with other health programmes.

In our opinion, programmes will usually be tested locally in a few districts or provinces in order to: *a)* establish that the programme actually meets the above requirements; *b)* demonstrate that achieving the aims of the programme is indeed possible; *c)* integrate the local factors, taking account of those specific to each country, and of cooperation between the agencies involved in implementation; *d)* allow an evaluation of coverage, seroconversion and costs which can be carried out after one year of work, so that within 12 to 14 months the national authorities will have a basis on which to build a national policy; and *e)* provide a basis for training the health personnel who will be in charge of scaling up at national level.

Once the decision has been taken to expand the programme on a national scale, the next step will be extension nation-wide of the mobilization, education and sensitization process already tested locally, with a view to achieving coverage higher than two-thirds to three-quarters of the target population.

The problems of multiple sessions in West Africa

The Expanded Programme on Immunization (EPI) involves contact with children at least four times in the first year of life.

However, due to a series of logistical problems, such coverage is usually difficult to achieve in tropical Africa, particularly in the member countries of the Organization for Co-ordination and Co-operation in the Control of Endemic Diseases (OCCGE) which, in particular, coordinates the immunization activities of eight French-speaking countries of West Africa (Benin, Burkina Faso, Ivory Coast, Mali, Mauritania, Niger, Senegal, and Togo). In these countries an average of over 80% of the population lives in rural areas.

Many infrastructures are still insufficiently developed. Health facilities are scarce and sometimes non-existent in rural areas, which may have only a few under-equipped clinics in large villages to which the populations of smaller villages having no health facilities have to go, sometimes making very long journeys, as mobile teams are unable to visit small villages frequently enough. Mothers are overburdened with work, and an immunization programme requiring them to walk to a health centre more than three or four kilometres away is often unlikely to be very effective.

The rainy season in West Africa presents a particular problem. It lasts two to five months, during which roads, many of which are unsurfaced tracks, may be flooded, making it difficult both for mothers to reach health centres and for vaccination teams to travel to villages. In addition, crops are planted during this season, and many people, including city dwellers, work in the fields so as to ensure a food supply for the rest of the year. Many families move temporarily close to the fields to avoid returning to their village every day, with the result that they are not present when a vaccination team arrives. Little work can therefore be done on immunization during the rainy season, which means that only seven to 10 months a year are available for such programmes to be carried out.

There has also been a significant drop-out rate in immunization programmes; as many as 20 to 30% of children may drop out between one session and the next. This clearly requires increased mobilization and health education efforts, but the drop-out rate could also be significantly reduced in the short term if a two-session immunization programme could be introduced.

If implementation of EPI is to be accelerated in countries with dispersed populations, lacking in health and education infrastructures and qualified personnel, where the seasons and the rhythm of the agricultural work cause logistical problems in bringing vaccination to the people, a simplified schedule presents numerous advantages and few serious disadvantages.

A simplified immunization schedule

The main disadvantages of an immunization programme comprising two vaccination sessions are that the optimum age for each vaccination cannot always be followed, and that some children may have to wait too long a time before receiving their first or second doses. Children who are less than 2 months old when the vaccination team comes to their village may have to wait until reaching the age of 8 months before receiving their first series of vaccinations, and those not present in the village when the vaccination session was held may have to wait six months before completing their immunization schedules. On the other hand, even in the regular EPI the interval between sessions due to logistics and other constraints has occasionally been found to be longer than that specified in the recommended EPI schedule. For instance, an evaluation in Mauritania[1] revealed that the average interval between two sessions of the regular EPI was 160 to 180 days. The issue of whether sufficient protection can be provided in two sessions is discussed further.

These disadvantages, however, are outweighed by the advantages of the schedule. As vaccination teams only have to visit each vaccination site twice a year, health teams can cover a wider area leading to the possibility of biannual visits to remote villages, and by spacing the sessions at six-month intervals, the rainy season can be avoided.

A further advantage of reducing the number of vaccination sessions relates to cost. The cost of delivery accounts for a considerable proportion of the cost of immunization, so that a reduction of one session would bring considerable savings even if a vaccine of higher unit cost were to be used. Cost savings achieved by reducing the number of vaccination sessions can then be used to finance communication expenses and other activities.

Simplifying the immunization schedule primarily involves reduction in the number of contacts with infants to achieve their protection. The universally recognized schedule means five contacts within the first year of life:

- BCG and oral polio vaccine (OPV) at birth or soon after;
- DPT and OPV at 6, 10 and 14 weeks;
- measles vaccine at 9 months.

This can obviously be best achieved where all the population has easy access to health services. But it also explains why national coverages remain so low in many parts of the world today, after more than 10 years of efforts.[2]

On the other hand, if the number of vaccination sessions is to be reduced, vaccines must be used which provide full protection after administration on only two occasions.

Types of vaccines suitable for use in a two-session programme

With a view to accelerating EPI in West Africa, the performance of new vaccines and the possibility of reducing the number of vaccination sessions from three or more to two, particularly in areas where delivery is difficult and the drop-out rate high, has been studied by the *Association pour la promotion de la médecine préventive* (APMP) with vaccine manufacturers since 1975, and jointly with the OCCGE since 1979.[3, 4]

The vaccines which ensure a high degree of protection after only one administration are those protecting against measles, tuberculosis and yellow fever. The vaccines currently requiring more than one administration are those against diphtheria, tetanus, pertussis, and paralytic poliomyelitis.

The poliovirus vaccine

The poliovirus vaccine presented the main problem in terms of a simplified schedule for several reasons. Individual failures of OPV in tropical surroundings have been reported after administration of three doses of a controlled potent vaccine.[5, 6] The authors of these published observations have recommended that five doses be given. WHO now recommends that a fourth dose should be added at birth to the three originally recommended for administration at 3, 4 and 5 months, now 6, 10 and 14 weeks.[7]

OPV is heat sensitive. Now that freeze-dried BCG, measles and yellow fever vaccines have been thermostabilized and no longer require a negative temperature cold chain (−20°C) but only normal refrigeration (+4 to +8°C), OPV is the only vaccine which has to be kept frozen at central (and often regional) level, adding considerably to the cost of cold chain equipment (investment, running cost, maintenance). On the other hand, OPV can be administered by untrained community volunteers with positive results on the incidence of the disease, as evidenced in Brazil, Cuba and other countries in single-disease campaigns.

The cold chain problem and the number of doses required have led us to reconsider the inactivated (or killed or Salk) vaccine: KPV. The main difficulty with this type of vaccine to date has been solved by the use of a continuously propagating Vero cell line on microcarrier in large fermenters (1,000 litre tanks) which can produce millions of doses in a few weeks.[8] Vaccines using different amounts of D-antigen units for each of the three types of poliovirus have been extensively tested in both developed and developing countries, and controlled trials have been carried out in recent years in Burkina Faso,[9] Ivory Coast,[10] and Mali.[11]

The killed poliovirus vaccine has now been standardized and adjusted to an antigen level which can produce seroconversion in 100% of vaccinated children after two doses. This vaccine, called KPV (40-8-32) (containing 40, 8 and 32 D-antigen units for types I, II and III respectively), was among those tested in a study in Finland[9] to compare the antibody titres achievable with varying D-antigen levels in the vaccine. The shaded area of Figure 1 shows the geometric mean antibody response to a single dose of the KPV (40-8-32) vaccine found in the Finland study.

Melinda Moore (CCCD, CDC) has recently reported consistent results obtained with the vaccine in more than 12 studies, which showed that between 97 and 100% of children acquired protective antibodies after only two doses.[12] A further advantage of the new KPV (40-8-32) vaccine is that it can be combined with DPT vaccine in the same vial or syringe.

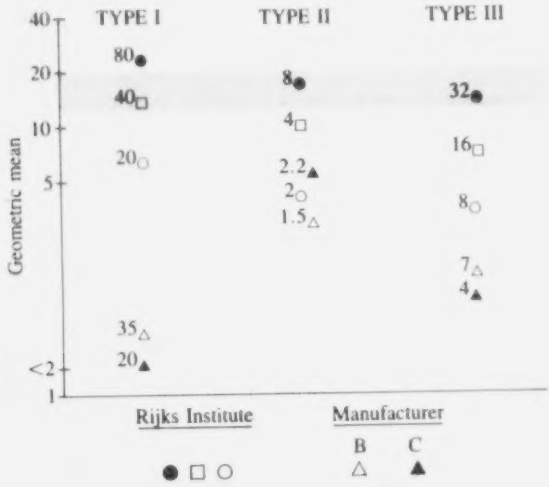

Fig. 1: Finland inactivated poliovirus study

Geometric mean neutralizing antibody titres (reciprocal serum dilution) induced by a first dose of vaccines of different D-antigen unit content: comparison of vaccines prepared by *Rijks Instituut voor de Volksgezondheid* and by manufacturers B and C.

Source: J. Salk, P. Stoeckel, A. L. Van Wezel, K. Lapinleimu, and G. van Steenis, Antigen content of inactivated poliovirus vaccine for use in a one- or two-dose regimen, *Annals of Clinical Research*, vol. 14, 1982, pp. 204-212.

Combined DPT and polio vaccine

If the combination of DPT and polio vaccines is effective when only two doses are administered, then the immunization schedule can be considerably simplified. Since 1980, studies have been carried out in the field to test the efficacy of a combined DPT-KPV (40-8-32).

In the case of diphtheria and tetanus it is now accepted in the scientific community that, providing the vaccine is of good quality, two doses provide satisfactory protection.

For pertussis the problem is more difficult to analyze, because we do not have at our disposal a good serological tool to measure the protective effect of two doses of vaccine in children. Epidemiological observation would certainly be of great value, but the disease is not always easy to diagnose, particularly in developing countries, and sources of observation are not equally reliable. Work on the pertussis vaccine is therefore still continuing, and a new, improved vaccine is under evaluation which may become available in the next two or three years. In the meantime, reliable results from Israel, Kenya, Mali, the Philippines, and Senegal suggest that a schedule using two doses of good quality pertussis vaccine is effective.[13, 14, 15]

An example of a simplified immunization schedule

A simplified immunization schedule was introduced in Kolda (Senegal) in January 1980, Thiès (Senegal) in 1982, Kaya (Burkina Faso) in December 1982, and Kolokani (Mali) in November 1983.

For both epidemiological and logistical reasons the vaccines are administered in association. The combination of the DPT and polio vaccines is effective and has been used for many years, and it is quite feasible to administer both the BCG and yellow fever vaccines (where needed) at the same session. In addition, no fundamental objection is raised in the literature to the simultaneous administration of the measles vaccine.[15, 16, 17, 18]

The following schedule was therefore developed for use in these programmes, two sessions being held on average six months apart (four to eight months):

Age of child	**Vaccine**
3-8 months	BCG 1st DPT-polio KPV (40-8-32)
9-14 months	2nd DPT-polio KPV (40-8-32) Measles Yellow fever

Where permanent health centres exist, with well-trained staff and reliable equipment, the second DPT-polio dose can be given earlier, two months after the first.

Personnel

Each vaccination team consists of four persons, if possible from the areas covered by the team, working under the supervision of the doctor from the permanent health centre where the team is based.

- The team leader (a qualified male nurse) is responsible for the initial clinical examination of the child and administering the BCG vaccine by intradermal injection, all other vaccines being administered by jet injector.
- An assistant team leader, who may be a traditional birth attendant, talks to mothers prior to the vaccination sessions, explaining the concept of immunization and the diseases children should be immunized against. She also discusses nutrition supplements and demonstrates the preparation of supplements using local products. She may give vaccinations by jet injector.
- A driver-mechanic is responsible for the maintenance of the team's equipment, including the vehicle, cold chain equipment and jet injectors. He is also trained in the use of injectors.
- An assistant also trained in vaccination, but whose main task is to go ahead to the next village on a light motorcycle after the vaccination session to prepare the work for the following day.

The training of the team is essential. The first step is to convene a seminar of all medical and paramedical personnel in the administrative area (district, province, etc.) to explain the programme and recruit staff for the mobile teams. Staff selected for the teams are given field training during a three- to six-month period by an African technician under the supervision of a project doctor. The training of the team and mobilization of mothers are considered to be as important as the quality of the vaccines used.

Equipment

Each mobile team has a pickup truck fitted with an additional 125 amp battery to operate a portable refrigerator during the drive and short stops. During longer stops, the refrigerator is operated by gas. A light motorcycle is carried on the vehicle, together with all necessary immunization and sleeping equipment. Each village is responsible for providing an area where the vaccination sessions can be held, which can be screened off by the team.

Schedule of visits

In principle, the teams work approximately seven or eight months a year, 15 to 20 days a month. Each vaccination round lasts about four months, from February to June and September to January, thereby avoiding the rainy season. Each team can cover an area of 180,000 to 240,000 inhabitants (more if there are permanent health centres). Each family is seen individually at the vaccination sessions, and a vaccination certificate in a plastic envelope given for each vaccinated child.

Evaluation

The results of these programmes are evaluated annually, and show to date that in rural areas, 68% of children in the target population (3 to 14 months old) have been fully immunized in Kaya and 43% in Kolda. The figures for urban areas are 80% for Kaya and 40% for Kolda. These results indicate that mobilization is still insufficient, particularly in urban areas, although one reason for low figures in some areas was that some parents who claimed that their children had been vaccinated were unable to produce the certificate, and their children could not therefore be included among the statistics of vaccinated children.[19] The major reason for lack of vaccination proved to be the child's absence from the village on the vaccination day for various reasons, lack of knowledge of the programme being relatively uncommon.

Serological evaluations are available for Kolda and Kaya. The Kolda evaluation relates to the polio vaccine used at the start of the programme KPV (40-4-16), later replaced by the new KPV (40-8-32) vaccine, for which a serological evaluation is not yet available. The results of the evaluation carried out six months after the second session are shown in Table 1.

TABLE 1

Serological evaluation, Kolda

Vaccine	% of seropositives
(40) Polio I	97.4
(4) Polio II	97.7
(16) Polio III	90.0
Measles	95.0
Yellow fever	75.0

Source: P. Stoeckel et al., Use of killed poliovirus vaccine in a routine immunization program in West Africa, *Reviews of Infectious Diseases*, vol. 6, suppl. 2, May-June 1984, pp. S463-S466.

The Kaya evaluation, performed on 24-29 January 1984 on a cluster sample of 74 children, covers tetanus, diphtheria, polio and measles (see Table 2).

TABLE 2

Serological evaluation, Kaya

Vaccine	% of seropositives
Tetanus	100
Diphtheria	94
(30) Polio I	96
(6) Polio II	100
(24) Polio III	100
Measles	90

Source: *Résultats de l'évaluation sérologique du PEV de Kaya réalisée à l'occasion de l'évaluation de couverture vaccinale du 24 au 29 janvier 1984*. Association pour la promotion de la médecine préventive, Paris, 1984.

These results correspond to the findings of more thorough clinical and serological trials performed in duplicate with the same vaccines in both developed and developing countries,[20] and further trials are in progress in other parts of Africa, Asia and the Middle East. A particular feature of the Kolda programme is that the vaccines performed as expected when used by routine vaccination teams, despite the fact that a considerable number of the children vaccinated (about one-third) presented various degrees of malnutrition.[19]

Cost evaluations

Preliminary estimates indicate that the costs of the simplified EPI schedule operated in Kolda and Kaya are considerably lower than those incurred in the implementation of the standard EPI schedule in neighbouring countries in which conditions are generally similar, despite the fact that due to local epidemiological conditions the yellow fever vaccine was added to the standard EPI vaccines.

The cost figures available for Kolda cover the period 1982-1983 (see Tables 3 and 4).

TABLE 3

Cost per fully immunized child, Kolda, 1982-1983

Type of cost	Francs CFA	US dollars
Salaries	770.54	2.20
Vaccines	612.93	1.75
Operating costs	700.63	2.00
Total cost of operation	2,084.10	5.95
Depreciation	248.49	0.71
Total	2,332.59	6.66

Number of children vaccinated: 35,242.
Cost per fully immunized child: US$ 6.66.
Exchange rate: US$ 1.00 = 350 francs CFA.

Source: P. Caudrelier, *Le programme élargi de vaccination de la zone pilote de Kolda (Sénégal): aspects généraux et financiers*, Association pour la promotion de la médecine préventive, Paris, 1984.

TABLE 4

Total EPI costs, Kolda, 1982-1983 (in francs CFA)

Type of cost	Total costs	% of total
Salaries	10,189,650	33.03
Vaccines	8,105,328	26.28
Operating costs	9,265,099	30.04
Total cost of operation	27,560,077	89.35
Depreciation	3,286,000	10.65
Total	30,846,077	100.00

Source: P. Caudrelier, *Le programme élargi de vaccination de la zone pilote de Kolda (Sénégal): aspects généraux et financiers*, Association pour la promotion de la médecine préventive, Paris, 1984.

The cost figures for Thiès are shown in Table 5. In calculating the cost per child, a fully immunized child is taken to have received the two sets of vaccinations, as a result of which the cost per child is increased through drop-outs.

TABLE 5

Total EPI costs, Thiès, 1983-1984 (in francs CFA)

Type of cost	Total cost	% of total
Personnel	3,482,000	28.6
Vaccines	4,717,750	38.6
Transport	1,521,615	12.5
Training, administration and evaluation	540,373	4.4
Buildings	76,500	0.6
Vehicles	978,125	8.0
Cold chain	315,400	2.6
Injectors	568,750	4.7
Total	12,200,513	100.0

Number of children vaccinated: 39,044.
Cost per fully immunized child (1984): US$ 2.60.
Exchange rate: US$ 1.00 = 400 francs CFA.

Source: J.-H. Thieffry, *Mise en place et évaluation d'un programme élargi de vaccination en milieu rural africain, Thiès, Sénégal*, Thèse d'Etat, Université de Picardie, 1984, p. 97.

Table 6 shows the cost of the Kaya operation per fully immunized child. The operation has been costed in accordance with WHO guidelines, a distinction being made between operating (or recurrent) costs, and capital costs, taken as investment requiring renewal at intervals of more than one year. The table covers costs for the period 1 November 1982 to 30 October 1984, i.e., from the beginning of the programme (personnel training) to the end of the Vaccination Commando campaign.

TABLE 6

Cost per fully immunized child, Kaya, 1982-1984 (in Dutch guilders)

Type of cost	Total costs	Cost per immunized child	% of total
1. Operating costs			
a) Salaries: local personnel	34,695.65	1.22	11.2
b) Vaccines	143,586.69	5.06	46.5
c) Transport	13,346.49	0.47	4.4
d) Personnel training	5,333.76	0.19	1.7
e) Population motivation	2,183.06	0.08	0.8
f) Jet injector maintenance	2,818.35	0.10	0.9
g) Miscellaneous	12,358.66	0.44	4.0
2. Capital costs	37,600.16	1.31	12.0
3. Other costs			
a) APMP costs	22,162.56	0.78	7.2
b) Logistics officer	34.957.08	1.23	11.3
Total costs	309,042.46	10.88	100.0

Number of children vaccinated: 53,214.
Number of children fully immunized: 28,395.
Cost per fully immunized child: 10.88 guilders (US$ 3.32).

Source: Jan Omvlee, *The expanded programme on immunization (EPI) in Burkina Faso: the costprice of a full infant vaccination in the region of Kaya*, Stichting Redt de Kinderen, Netherlands, 1986, in press.

The simplified schedule was implemented at a lower cost than the standard schedule because the number of doses required to immunize each child was reduced, and this factor, together with the significantly lower number of personnel required to operate the programme and the fact that each team member was trained to perform a variety of tasks, outweighed the additional cost incurred in using the more concentrated vaccines designed especially for use in the programme and therefore produced in small amounts.

It would be difficult for fixed costs to be further reduced, although mass production of this new DPT-KPV (40-8-32) will probably be reflected in a decrease of price per dose. Some of the variable costs involved in the programme could conceivably be reduced in the future, by further diversifying activities in order to reduce personnel costs, reducing the amount of supervision required by expatriate personnel, and even by investigating the possibility of further reducing the number of injections required to give immunity, or reducing the number of visits by each team from two to one a year, which, in epidemiological terms, could be feasible.[21]

These cost factors together with coverage surveys and results on efficacy suggest that the simplified EPI can represent a cost-effective alternative to conventional EPI in the developing countries.

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Corridors of peace in Uganda

Immunization efforts are normally hampered, and at worst come to a complete standstill, in a country at war or divided by civil war, and those who mainly suffer are the nation's children, who represent its future. In Uganda, UNICEF was successful in persuading both sides to the civil war to allow the nation-wide immunization programme to carry on despite the conflict.

In November 1985, one-third of the population of Uganda (5 million people) were isolated after all road, rail and air links along the front line of the civil war were severed. A peace agreement was later signed, but the ceasefire proved short-lived.

In July 1985, a nation-wide immunization programme had been set up, operating through a network of 150 rural health centres already engaged in other UNICEF programmes. Shortly after the country was divided, UNICEF approached the military government in Kampala, requesting permission to fly vaccines, oral rehydration salts (ORS) and medicines to the area held by the National Resistance Army (NRA), in order to keep the immunization programme working. An initial request for the UNICEF representative to travel to the area was refused, but eventually a carefully-worded compromise was negotiated in which the government stated that it had no objection to UNICEF personnel travelling to any part of the country, although their security could not be guaranteed. Clearance was then obtained from the NRA.

The first flight reached Kasese, where the NRA headquarters is based, on 24 October 1985. This first consignment consisted of vaccines, ORS and other medical supplies donated by UNICEF and the International Committee of the Red Cross (ICRC). Subsequently, UNICEF and ICRC sent a convoy of vehicles from Kampala through north-east Zaire to Kasese. Radio communications were established and regular flights planned.

Under this agreement, over 40 flights reached the NRA-held area. Vaccines and immunization materials were delivered to

11 of the 14 districts where immunization programmes were operating, essential drugs were delivered to 58 rural health centres, and medical supplies reached 11 hospitals.

This is believed to be the first time that a corridor of peace has been established in Africa during a conflict of such a size and nature. It is hoped that this example, in which both sides to a civil war cooperated with international agencies to serve women and children on both sides of the conflict, will serve as a precedent in other war and conflict situations.

Cole Dodge
UNICEF Representative
Kampala

Case study

Immunizing the children of China

Introduction

"I wish to express my gratitude to the international and national organizations which are cooperating in the promotion of child health services in China. As part of global EPI activities, child immunization in China has achieved unprecedented momentum.

"The whole nation is striving for universal child immunization. China is a developing country with one-quarter of the world's population, and a great effort will be required. Nevertheless, it is my conviction that working within our national conditions and realities, we can reach the goal of immunizing our children before 1990."

Cui Yueli
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Assignment Children, vol. no. 69/72, 1985

Immunizing the children of China

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While in some areas immunization rates of 90% or above have already been achieved in China, the more remote and mountainous areas in particular represent a great challenge requiring organizational skills, motivation and commitment of resources.

The present case study prepared by government health officials and by UNICEF staff in Beijing, discusses the efforts made so far, the strategies adopted and the plans for the future: 1986-1990.

With almost one-quarter of the world's children, China has decided to accelerate greatly its national immunization programmes as part of the United Nations-supported goal of trying to reach universal child immunization by 1990. The Government of the People's Republic of China has committed itself to immunizing at least 85% of children under 1 year of age in each province by 1988 and 85% in each county, including those in remote areas, by 1990. This degree of coverage, now labelled the "85-85" target, will be sufficient to reduce to very low levels the threats to health posed by measles, poliomyelitis, diphtheria, pertussis, tetanus, and childhood tuberculosis.

The achievement of this goal *equitably* in all of its counties will be a staggering task, even for China with all of its successful experience and infrastructure for improving the health of the people. Some of its more developed and populous areas have already achieved child immunization levels of 90% or more. But the remote desert and mountainous areas and the minority populations of about 70 million represent a great challenge to the organizational and logistical skills of national leaders. This will require motivation and commitment of resources at a level that parallels and possibly exceeds many of the other massive health campaigns China has mounted in the past.

Background

Before liberation, infectious diseases were rampant in China. Epidemics of smallpox, cholera, and the plague swept through the crowded population centres where the vulnerability of the people was accentuated by poverty, natural disasters, lack of health services and the disruption of almost 50 years of constant civil strife and war. Yet, as in most developing countries today, the biggest killers were the diseases common to childhood: diarrhoea, pneumonia and the vaccine-preventable diseases, all exacerbated by malnutrition. Infant mortality rates were frequently over 200‰. It is significant that, in 1949, the new government, immediately after assuming power, began to address these health problems as among its highest priorities.

Following liberation, health services in China changed dramatically. Rural areas and preventive programmes consistently were given priority. Training of health personnel for rural areas was emphasized and a three-level medical and health network was established at county, township and village levels. Individual and collective self-reliance was promoted. Providing manpower and resources to staff and finance local services proved to be a key element in the rapid spread of more adequate primary health care.[1] This resulted, according to official figures, in the reduction of infant mortality to 35‰ live births. Infectious diseases were no longer the first cause of death and there was virtual elimination of some of these diseases. The most dramatic feature of these mass patriotic health campaigns was their great success in mobilizing the people. They were supported by the network of health facilities in the 2,218 counties with 2,308 county hospitals, 2,061 county epidemic prevention stations and 1,858 county maternal and child health (MCH) centres, which were staffed by 535,350 health professionals. Especially important were the more than 55,500 township (commune) health centres or hospitals with an estimated 1 million health professionals and the 707,168 village (brigade) health stations, each staffed by two to three barefoot doctors (idem). A major change has occurred in the last five years with some of the barefoot doctors moving into farming or sideline activities. In 1984, a Ministry of Public Health directive abolished the use of the term "barefoot doctor" and substituted the term "rural doctor". It is estimated that, in 1984, there were 1.25 million rural doctors, who were retrained barefoot doctors who had passed a mid-level proficiency examination. There were also 1.16 million health aids who had not passed this examination. Some of the practitioners in both groups are now working under the "responsibility system" and deriving their income directly from fees for service. Others are under various forms of government subsidy or collective financing. The widespread availability of health services and staff in China is stressed here because it is these workers in villages and urban neighbourhoods who will play a crucial role in immunization efforts. Complete coverage with immunization in China is within reach because of this health network. However, it should be noted that progress in improving health conditions has not been uniform in China, with the existence of major urban-rural and rural-rural differences.[2]

Local health services in China have been characterized by broad mobilization of the people who are involved in their own care and in the management and control of these services. Mass mobilization and action has succeeded in essentially eliminating a number of diseases, such as smallpox, cholera, kala-azar, the plague, rabies, venereal diseases, typhoid fever, typhus fever, and schistosomiasis.[3]

Political will, heightened social consciousness and intensive health education have been responsible for these mobilization efforts. People's participation has been stimulated by uniform party policy and by education through films, lectures, posters and drama. Intensive discussions and meetings have resulted in general participation in action to control and prevent disease. This involvement has not only improved health care but has also helped to raise and maintain the people's awareness of health matters. The immunization programme in China, therefore, is working with a receptive audience which is relatively well educated. Motivation has been significantly increased by the new levels of parents' concern for early child protection, due to the one-child population policy.

Although the receptiveness of the majority of the people is a positive aspect of the ambitious immunization plans of China, a particular problem may prove to be the presence of cultural constraints in minority nationalities. The difficulty will be compounded by the fact that they are located mostly in remote areas where health services' coverage is low. Mass mobilization in minority areas was successful for smallpox eradication due to widespread knowledge and fear of the disease. Variolation (inoculation with live smallpox virus from scales to induce a mild case of smallpox with low fatality rates) had been practised for centuries in many regions of China.

The six target diseases of EPI, however, have not been associated with so much public concern or supportive traditions and beliefs. In minority cultures, vaccination teams have sometimes encountered considerable resistance to immunization. Occasionally, a remote group may have a conviction that vaccination causes death in children. Focused educational efforts that are sensitive to cultural values and practices will be needed to overcome such obstacles.

Early EPI efforts

Despite considerable success in the elimination of certain epidemic diseases and a general decrease in the infant mortality rate, vaccine-preventable diseases have remained a serious problem in China. In 1978, there were 10,000 cases of poliomyelitis, 20,000 cases of diphtheria, 600,000 cases of pertussis and 1 million cases of measles, as reported by the Ministry of Public Health.[4] As in most reporting systems, many more cases probably occurred that were not reported. Specific studies, however, have attested to the significant impact of immunization in lowering the incidence rate for infectious diseases.[5]

In 1979, the government made the decision to initiate EPI efforts to immunize against the six diseases identified by WHO, because immunization programmes had previously had spotty coverage. Vaccines were being produced in seven vaccine institutes in various parts of the country (Beijing, Shanghai, Wuhan, Chengdu, Lanzhou, Kunming and Changchun). They were distributed once or twice a year to provinces, which promptly sent them to counties, which in turn promptly sent them to communes. Barefoot doctors bicycled to distribution points and back to villages where children were waiting. The whole process was supposed to be completed in less than three days. This campaign approach, using the "rush and relay" system, greatly improved coverage rates. By 1982, the Ministry of Public Health reported only 7,700 cases of poliomyelitis, 6,500 cases of diphtheria, 232,500 cases of pertussis, and 451,000 cases of measles.[6]

EPI, 1982-1984 (Phase I)

In 1982, UNICEF initiated its cooperation in the immunization programme (Phase I) focusing on two major activities. First, recognizing the great strength of being self-reliant in vaccine production but also that the quality of the vaccines produced in China left much to be desired, support was given to improve production in two institutes. Secondly, the national EPI programme was further supported by providing complete cold chain equipment and intensive training and management support to parts of five southern provinces. Eight cold chain lines, each covering 10 million people, were established radiating out from provincial capitals to provide refrigeration from central storage to ultimate use. This made it possible to vaccinate on a two-month or more frequent schedule. Other activities supported by UNICEF included training of staff and mass communication. Training was especially cost-effective because it also helped greatly to improve supervision and logistics management. For example, Fujian province alone trained over 30,000 EPI staff in more than 700 courses. The epidemic prevention stations also mobilized and used all the public media available for publicity about the need for immunization.

A systematic monitoring of coverage rates for BCG, DPT, OPV, measles, and full immunization with all four vaccines began recently through provincial-level cluster sample surveys. Data are available for 1983 and 1984.[7,8] However, sample sizes and methods have varied considerably. Aggregation of selected county-level surveys to produce provincial estimates have not been corrected for these differences. In addition, the 1983 data for 14 provinces covered 10 different age groups.[7] The definition of immunization also varied. In some surveys only first doses of DPT and OPV were recorded. Despite these inconsistencies, certain trends can be illustrated. For three provinces that benefited from partial cold chain coverage in the 1982-1984 period (Phase I) data are available from samples that partially included cold chain line areas. A comparison between the 1983 and 1984 cluster sample surveys is shown in Table 1.

The trend in Table 1 is towards increasing coverage even though the cold chain equipment was not fully in place by the time of the 1984 surveys. The discrepancy in coverage rates between individual vaccines and full coverage may be related to different definitions of immunization especially with DPT and OPV, as noted above.

Some data, specifically for cold chain areas, are also available. A WHO evaluation team in June/July 1985 toured four provinces, two of which were cold chain provinces. Their report[9] shows an increase in immunization coverage in cold chain areas and higher coverage levels compared to non-cold chain provinces (see Tables 2 and 3).

TABLE 1

Comparison between 1983 and 1984 cluster sample surveys

	Yunan	Sichuan	Hubei
Total population 1982 census (millions)	32.6	99.7	47.8

	Coverage (percentages)					
	Yunan		Sichuan		Hubei	
Vaccines	1983	1984	1983	1984	1983	1984
BCG	27	72	30	33	—	82
DPT	57	59	57	66	55	81
OPV	80	76	78	79	78	85
Measles	65	73	73	73	70	86
All four vaccines	18	20	12	13	—	61

TABLE 2

Immunization coverage rates in cold chain areas (Percentages)

	Fujian		Sichuan	
Vaccines	1982	1984	1982	1984
Measles	72	87	76	99
Polio	85	89	85	97
DPT	59	82	86	96
BCG	70	84	—	85

TABLE 3

Immunization coverage rates in non-cold chain areas (Percentages)

Vaccines	Jiangxi 1984	Guangdong 1984
Measles	69	57
Polio	70	73
DPT	54	62
BCG	72	36

No data were available from non-cold chain areas in provinces benefiting from cold chain infrastructure.

TABLE 4

Reported morbidity and mortality in China 1982-1984

	Cases			Deaths			Disease-specific mortality rate per 100,000			Case fatality rate (%)		
Diseases	1982	1983	1984	1982	1983	1984	1982	1983	1984	1982	1983	1984
Diphtheria	6,502	7,227	3,418	741	740	372	0.07	0.07	0.04	11.3	10.2	10.9
Pertussis	232,503	331,419	215,965	373	309	333	0.04	0.03	0.03	0.16	0.09	0.15
Measles	451,045	781,475	619,709	4,309	4,021	2,906	0.42	0.39	0.28	0.96	0.51	0.47
Polio	7,741	3,296	1,626	157	57	50	0.02	0.006	0.005	2.0	1.7	3.1

Tetanus and childhood tuberculosis are not being reported yet, even though neonatal tetanus and tuberculous meningitis continue to be problems in some of the less developed areas.

Source: Ministry of Public Health, People's Republic of China

The EPI effort in China has continued to make considerable progress. For 1984, diphtheria morbidity was reported at 0.3/100,000 population, pertussis at 22/100,000, measles at 62/100,000 and polio at 0.1/100,000.[6] Table 4 gives morbidity and mortality for 1982, 1983 and 1984, as reported by the Ministry of Public Health.

The WHO evaluation team in 1985[9] obtained the data shown in Table 5 on morbidity in two cold chain areas, suggesting an association between increased immunization coverage and reduced morbidity rates.

TABLE 5

Morbidity in two cold chain areas
(cases per 100,000)

	Sichuan		Fujian	
Diseases	1981	1984	1982	1984
Diphtheria	1.25	0.57	2.04	0.56
Pertussis	37.52	12.08	23.39	10.52
Measles	123.65	81.18	23.70*	50.68*
Polio	0.07	0.03	1.78	0.09

* Due to an outbreak of measles in Fujian which affected the age group above 8 years —formerly not vaccinated—an increase in measles was recorded.

EPI, 1985-1989 (Phase II)

Following the successful 1982-1984 project in five provinces, a systematic extension was planned over the next five years to 14 more provinces with 18 cold chain lines to cover 180 million people. Phases I and II were planned before the Government of the People's Republic of China decided to support universal child immunization by adopting the 85-85 programme. Originally these EPI projects, supported by UNICEF, would have benefited only a population of 240 million in 19 provinces (Sichuan province was to receive cold chain lines in both time periods), even though the total population of those provinces is 840 million. It was planned that the areas not covered by the project would be given sufficient infrastructure so that the government could provide the equipment to support high levels of coverage of all the children in these provinces. Other provinces, where no EPI efforts were planned, were the autonomous regions in the north-west and south-west (Xinjiang is being provided with cold chain equipment by a WHO/WPRO project), three north-eastern provinces which are reported to have very high vaccination and health services coverage rates, as well as three major municipalities (Beijing, Tianjin and Shanghai).

For the 1985-1989 Phase II EPI programme in 14 provinces, UNICEF had committed resources for cold chain and refrigeration equipment, transport, equipment to monitor vaccine stability and surveillance, and for the support of personnel training. In addition, support was committed to correcting production and quality bottlenecks in the seven vaccine institutes. A World Bank loan is projected eventually to finance the building of three totally new vaccine plants, but their production will not become available until after 1991. By that time, the major thrust of the immunization effort should be completed and the maintenance phase of activities will be all that is required.

Implementation of Phase II was just beginning when China adopted its universal child immunization goals, putting a completely new focus on EPI in the country.

85-85 programme, 1986-1990 (Phase III)

In August 1985, during the visit of the executive director of UNICEF to China, intensive discussions with leaders at all levels resulted in a national commitment to accelerate EPI coverage to 85% in all provinces by 1988 and 85% in all counties by 1990. President Li Xiannian inaugurated a mass national effort on 26 September 1985 by himself administering polio vaccine to pre-school children in Beijing. Similarly, several governors and other officials are committed to starting major efforts in their own areas.

An interministerial Leading Group of high level officials is being planned, which will coordinate multisectoral participation, including the Ministry of Public Health, Ministry of TV and Broadcasting, All China Women's Federation and the State Education Commission. Overall coordination of UNICEF's inputs will be through the Department of International Relations of the Ministry of Foreign Economic Relations and Trade.

The executing arm for the national EPI programme will be the Ministry of Public Health with the Department of Epidemic Prevention responsible for cold chain extension, the MCH Bureau responsible for MCH support and the Bureau of Pharmaceutical Administration responsible for vaccine production. Cold chain extension is by far the largest component of Phase III.

There is agreement now that Phase III will give immediate priority attention to autonomous regions and remote areas, namely, Xizang (Tibet), Nei Monggol (Inner Mongolia), Gansu, Qinghai, Ningxia, Guizhou, and Guangxi (Guangxi was partially covered in Phase I). These areas require the longest lead-time to put infrastructure in place and to implement massive health education programmes in their predominantly minority cultures.

The "rush and relay" method is clearly inadequate if the 85-85 targets are to be attained. A vital factor will be the increased frequency of distribution of vaccines that retain their potency. Immunization will be carried out on a weekly, monthly or seasonal basis, according to the particular plans of each province. The changes required in the distribution/logistics systems will depend on the adequacy and appropriateness of the cold chain that is available. There are strong indications, from the data already presented, that a direct association exists in China between cold chain infrastructure and rapid increases in immunization coverage rates, which are themselves associated with reducing the incidence of the six EPI target diseases.

The 85-85 programme plans include nation-wide cold chain coverage by the end of 1987. Whilst equipment requirements to date have been based on cold chain lines standardized for a population of 10 million, modification of standards will be made to down-scale lines in more developed provinces, where the maintenance phase has essentially begun, and to up-scale lines in sparsely populated remote regions. Phase III will provide cold chain equipment which will include items such as walk-in cold rooms, freezers, refrigerated trucks, and provisions to improve supervision and maintenance, technician training, quality control and surveillance. In this context, there are some five provinces and municipalities (with a population of 100 million) which are already very close to achieving the 85% goals and could do so by 1986. About eight provinces (with a population of 300 million) have already made good progress and should reach the 1990 goal by 1988. The remaining 600 million population coverage should be achieved by 1990 at the county level.

The Ministry of Public Health will support a national personnel training programme, to upgrade the skills of 250 senior staff in EPI and cold chain management by 1987, of 200 senior technicians in cold chain maintenance and repair by 1988, and of 200 senior staff in EPI surveillance also by 1988. Similar training plans will be set up at the provincial, prefectural and county levels by the corresponding epidemic prevention stations. The county station is entrusted with the ongoing training, orientation and supervision of township health workers and, through the township level, of village-level health workers.

Vaccine production

In 1984, China issued 480 million EPI vaccine doses, excluding tetanus toxoid (TT),[7] for the immunization of children up to 12 years of age. Whilst the quantity of vaccine production is sufficient to meet the projected needs of accelerated EPI, major problems remain in improving vaccine quality. Most of the seven vaccine production institutes have out-of-date buildings and equipment, with limited air-conditioning and environmental controls. This has caused disjointed process flows and problems in maintaining product sterility. There are major deficiencies in the lack of adequate in-process and final product cold storage facilities. Careful attention must be given to appropriate refrigeration during the production process as well as to the "vanguard" cold chain system that protects vaccines from the point of production until delivery at the provincial level. Management training will also be essential to attain "good manufacturing practice" (GMP) in the institutes.

Universal freeze-drying and vacuum packing for measles and BCG will be introduced. It is proposed that production shift from ampoules to vials to allow for secure vacuum packing. Freeze-dried vaccines in vials will reduce the high level of wastage in field use. A 10-dose ampoule of measles now often provides only two to three doses before having to be discarded, especially in remote areas with dispersed populations.

Product standardization is another area that requires attention. At present, the institutes produce different product types, doses, ampoule sizes, and packaging. This causes confusion among field workers and varying storage requirements. The biological code for vaccines needs to be updated and quality control strengthened.

Another area of concern is the inappropriate media used for vaccine preparation. Monkey kidneys used for polio vaccine are sometimes infected with the SV-40 virus. Chicken embryos used for measles vaccine production are not "specific pathogen free" (SPF). Pertussis vaccine has high toxicity levels that cause a cautious approach to vaccine dosage which is below WHO recommended standards.

Support will be provided on two levels: system-wide and by individual institute. The former will include management training specific to the production of biological products, as well as facilitating efforts in process and product standardization. Similarly, the upgrading of quality control laboratories in each institute will be implemented. At the level of individual institutes, production equipment and machinery will be provided, as will vanguard cold chain equipment for vaccine storage.

It has been agreed to set annual production levels at 110 million doses for OPV, 100 million for measles, 80 million for BCG, and 100 million for DPT, with a projected production of 50 million doses of tetanus toxoid. These figures may be adjusted later, depending on actual usage.

The national EPI effort has set the target population at a constant 21 million per year in the under 1 year age group, until the end of the decade. This is realistic given the present growth rate figure of 1.8% and the "one child per family" policy. EPI vaccine production, however, has to consider the whole immunization schedule up to 12 years of age.

Social mobilization

Social mobilization will be a key factor in successfully reaching country-wide coverage. Production and widespread use of publicity materials for communication through all possible media will be used to support the mobilization effort. The great variety of cultural backgrounds in China will require considerable ingenuity in penetrating remote regions with the immunization message. The EPI Leading Group will be responsible for the mass mobilization efforts, but specific activities will be implemented through the Ministry of Public Health, the All China Women's Federation, the State Education Commission, and the Ministry of TV and Broadcasting. Special emphasis will be given to autonomous regions and minority areas where culture-specific adaptations will be needed. Production equipment for publicity materials will be provided; for example, appropriate immunization and health textbooks for the 136 million primary schoolchildren in China. National, provincial and local seminars will be supported in order to coalesce joint action in mobilization.

Integration of EPI with MCH

The integration of immunization activities with MCH will be a major focus of Phase III. Epidemic prevention stations responsible for EPI are situated at provincial/prefectural and county levels. At the township and village levels, the PHC network, including rural doctors, is responsible for implementing immunization activities. Phase III, therefore, recognizes the importance of the MCH network and its involvement, not only in implementation, but also to ensure the integration of immunization activities with health services. Such integration will become increasingly important for continuity once immunization coverage reaches levels that would justify phasing into the maintenance phase of EPI. Integration is especially important in the autonomous regions where MCH services are weak. For instance, in Xizang (Tibet) child mortality in the under 3 year age group was reported to be 190‰ in one household survey. MCH services are just being started with a centre in Lhasa which will be used to train MCH workers for the region. Insufficient numbers of rural doctors have been trained. Birthing practices are hazardous for both mother and baby and there is probably considerable unreported neonatal tetanus. Where there are no birth attendants and when an older female family member is not around to assist during a delivery, women sometimes have to go out alone to the yak and sheep sheds to have their babies.

The Department of Epidemic Prevention of the Ministry of Public Health is responsible for the administration of DPT, OPV, and measles, whilst MCH administers TT and often BCG, which may in some places be the responsibility of anti-tuberculosis services. Maintenance activities to ensure continuity of immunization will need to be well planned so that after 85% county coverage has been achieved immunization of infants will continue at a high level. It will probably be increasingly a responsibility of the MCH services to provide immunizations, working through networks of rural doctors and neighbourhood health workers.

The MCH component will include massive training of personnel for the autonomous regions of Xizang (Tibet), Nei Monggol, Ningxia, Guangxi and Xinjiang. Planned activities will include setting up six publicity and training centres, two MCH faculties in medical colleges to expand minority people's professional education in this field, and two midwifery training centres at the intermediate level. The latter will teach improved scientific delivery practices as a general intervention to safeguard against prenatal and postnatal complications. These preventive measures are needed to reduce the incidence of neonatal tetanus, which still occurs in remote regions.

EPI surveillance and monitoring

The ability to monitor progress in vaccination coverage and decline of morbidity and mortality rates of the six EPI diseases is crucial in improving the quality of the national EPI effort.

The great need for improvement in methods used for cluster sample surveys has been stressed. Reporting of vaccination coverage is clearly inadequate. In 1982, a WHO evaluation team compared reported vaccination coverage in three counties in Hubei province with the coverage that would have occurred if strictly assessed according to WHO criteria. Vaccination was not considered adequate if the interval between doses was less than 30 days, if the child was not of a proper age when the dose was administered or if there was a discrepancy between home and health centre records.[10] Reported coverage rates of 89.3%, 85.9% and 90.3% for DPT were reduced according to WHO criteria to 40.4%, 21.9% and 50.0% respectively. Similar disparities were found in assessment of OPV and measles coverage.

Improved methods of annual cluster sample surveys will now be used to monitor vaccination coverage for DPT, OPV, BCG and measles. Up to 1988, 30-point clusters will be randomly selected in each province. Local units will be encouraged to analyze their own coverage statistics for monitoring purposes. Provincial data from cluster sampling for 1986, 1987 and 1988 will monitor the progress towards achievement of the 85% provincial coverage target. It is projected that county-level surveys can be systematically implemented in 1988, randomly selecting a certain number of counties either by province, by specific stratification or at the national level. Cluster sample survey methods will then be used within each county selected. This information would monitor progress towards achievement of the 85% county coverage target.

Improved morbidity and mortality reporting will be introduced for the six target diseases and neonatal tetanus, especially in the more remote regions where notification levels are now low.

As morbidity and mortality rates are reduced, increased sensitivity is required in reporting to measure change. An increasing number of heavily populated areas are within reach of following up every notified case to obtain an appropriate case history. This will be encouraged to identify and vaccinate susceptible contacts and check on vaccine efficacy.

It is expected that surveillance centres will be established in each province for data collection and statistical analysis. These centres will also monitor the quality of vaccines at each stage in the distribution system through spot checks of vaccine potency.

They will also test for levels of immunity achieved in children vaccinated by doing sample serum studies.

Fully equipped surveillance centres have already been established in three provinces and it is projected that all provinces should have some kind of centre within the next four years. The optimum balance of various surveillance approaches in the centres still needs to be determined, however. It is likely that epidemiological data collection and analysis of coverage and monitoring of disease should take precedence over laboratory analysis of vaccine quality and immunity levels.

The information generated by surveillance and monitoring will be used for decision making, especially with regard to the reallocation of resources. Formal annual evaluations will use up-to-date data in order to report on the progress made towards achieving the 85-85 targets.

The financing of immunization services

Financing of health services in China has, since 1949, been based on the principle of active participation and cooperation between the people and the government. Public money is used especially for capital construction and equipment costs, and for preventive services such as vaccine purchase. In 1984, in the Guangxi Zhuang Autonomous Region with a total population of 38 million, for example, government investment in EPI activities totalled 6,471,687 yuan (equivalent to around US$ 2.6 million at 1984 rates of exchange), 46% of which was for buildings and equipment and 23% for vaccine purchase from the vaccine production institutes.[11] There was no breakdown available for other levels of governement, but local service costs are paid by local units.

Some innovative financial incentives have been introduced in the national EPI effort. To ensure that the cold chain is maintained in working order, for instance, taxation of refrigerated trucks and charges for the electricity used for cold chain equipment have been reduced.[12]

Major changes have occurred in the financing of health care services since the introduction of general economic reforms in

1980. Collective financing and support for cooperative medical services have been greatly reduced, curative services are now mostly provided on the basis of individual payments of fees for service to practitioners at all levels.[13] Rural doctor financing methods are in a state of flux as many are being converted into private practitioners whilst reportedly retaining a high degree of social awareness and service motivation for providing preventive services for their community. They are paid 10 fen (around three cents) for a vaccination, either by the parents, by a collective health insurance scheme or as a subsidy by the township government, when parents have insufficient resources to pay. Rural doctors in many areas still cycle to the township health centre to collect vaccines, often to coincide with a retraining session of one to two days for which they receive meal allowances. There is, nevertheless, a growing tendency for the county and township levels to distribute vaccines down to the village level to relieve the rural doctor of this responsibility.

Conclusion

China has made remarkable progress in the reduction of morbidity and mortality rates for the six EPI diseases. EPI started in 1979 and has taken full advantage of public awareness of health needs and the capacity of the society to mobilize for specific health actions. Its implementation initially was carried out in a relatively ad hoc style of rapid vaccine distribution down to local levels for the immediate vaccination of lists of waiting children. The immunization schedule was implemented with varying results depending on the age at which it was considered completed.

A new immunization schedule now calls for full protection by four vaccines by the age of 1 year, with flexibility to extend the target age to 1.5 years in areas with difficult access. The move away from collective health financing towards individual payment for health services has caused a significant reduction in emphasis on preventive health measures. This makes the achievement of the new schedule and 85-85 coverage an even greater challenge.

Modernization is a major aim of EPI in China. An immediate objective is to deliver quality vaccines to the local level without loss of potency. Providing adequate cold chain equipment will eliminate the need for racing against time to immunize as many children as possible before the vaccines are inactivated. Equally important is the development of innovative strategies to provide coverage to remote and scattered populations. An appropriate combination of periodic focused efforts and ongoing integration with MCH services will need to be worked out. The continuing EPI programme will require maintenance of widespread public and government interest in immunization, through social mobilization techniques applied multisectorally. An efficient surveillance system to monitor vaccine quality, vaccination coverage and morbidity and mortality rates of the EPI targeted diseases will quantify progress towards the government goals.

As with the dramatic successes it has achieved earlier in controlling a wide range of infectious diseases, China may again provide an important example as the world's countries mobilize to achieve their own goals for childhood immunization.

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Case study

Tetanus toxoid immunization campaign in West Nusa Tenggara, Indonesia

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A tetanus toxoid (TT) immunization campaign was carried out in Central Lombok district of the Indonesian province of West Nusa Tenggara (NTB), from January to April 1985. A coverage rate of 93% for two doses was obtained among women of childbearing age. This paper summarizes the major components of the activity, and discusses some of the strengths and weaknesses of the campaign. Following a careful examination of the Central Lombok experience, East Lombok was selected as the site for a second UNICEF-sponsored TT campaign in NTB, and implementation began on 14 October 1985. In one district of Aceh province a campaign based on the NTB model began in early September 1985, and a similar campaign has been started in one district of East Nusa Tenggara, both funded by USAID.

This case study describes the implementation of the first campaign in detail; it discusses five major elements which contributed to its success, its shortcomings and some problems which remain to be solved, and how the experience of the campaign can contribute to improving the regular immunization services.

West Nusa Tenggara (NTB) province consists of two main islands, Lombok and Sumbawa, situated east of the island of Bali. The total population of the province in 1980 was 2.7 million. Central Lombok, one of the six districts constituting the province, had a total population of some 577,000 spread among

Assignment Children, vol. no. 69/72, 1985

849 villages. The overwhelming majority of the people are engaged in agriculture, and 96% are muslims. Almost 56% of the total population and more than 68% of the women of Central Lombok are illiterate.

Calculations based on 1980 census data showed that NTB had an infant mortality rate (IMR) of 186‰, by far the highest among the provinces of Indonesia. This was 1.75 times the national figure, and three times the level of the province with the lowest IMR.

Neonatal tetanus is a major contributor to infant mortality in the country as a whole, but is particularly significant in NTB. A detailed survey of the province in 1983 revealed an overall incidence of 16.7 neonatal tetanus deaths per 1,000 live births (versus 10.7‰ nation-wide), with Central Lombok district at 28.0‰.

Central Lombok was thus the logical choice for the first in a series of UNICEF-sponsored accelerated immunization campaigns against neonatal tetanus. A proposal to this effect was positively received by health authorities in both Jakarta and NTB.

Rationale for a once-only campaign

The routine immunization programme in Indonesia aims to provide protection against tetanus early in life, at school entry, and again in the final class of primary school at the age of 12 to 13 years. This system should provide relatively good tetanus immunity among girls entering the childbearing age group (the median age at first marriage in Indonesia is 16.4 years). However, even if coverage from this routine system were high (it is in fact only about 35%), no dramatic impact on neonatal tetanus would be seen for many years because of the large remaining cohort of women of fertile age who are too old to have benefited from the comparatively recent routine immunization programme. The crash campaign, therefore, was primarily addressed to this group of women. Its major objective was to raise the tetanus immunity level throughout the fertile age group and thus to achieve a dramatic reduction in the incidence of neonatal tetanus. It should be noted that this strategy calls for a once-only campaign to remove the "backlog" of unprotected women. A strengthened routine programme should then prevent the re-emergence of an unprotected cohort, and a single dose of TT vaccine during pregnancy should ensure continuing high immunity levels.

Implementation

Planning and preparation

A draft protocol for the campaign was developed by national and provincial health staff. The governor of NTB pledged the full support of the provincial administrative apparatus, and funds, equipment and vaccine were guaranteed at the national level.

Commitments of support were received from all relevant sectoral departments at provincial and district levels, including Religion and Agriculture as well as Health, in addition to locally-based organizations such as the Village Development Organization (LKMD) and the Family Welfare Movement (PKK). Following some refinement of the protocol, a series of meetings was held to explain the objectives and methodology of the campaign to representatives of the participating organizations in Central Lombok and its nine subdistricts.

Registration and information dissemination among target women

About two weeks before the vaccination activities began, PKK cadres—about 6,000 women in Central Lombok district—were provided with forms to take a census of all fertile women in their respective areas. The name, age and address of each woman was recorded. This information was consolidated at the village level, where a serial number was assigned to each name. The enumeration forms were later used as vaccination registers. The number of women identified in each village was reported to the appropriate health centre for use in planning vaccine requirements and the deployment of manpower.

Two or three days prior to the scheduled vaccination session, PKK cadres again visited all women on their census list to inform them of the place and time of the vaccinator's visit and to distribute appointment cards which carried serial numbers matching those on the census list. This greatly facilitated finding a particular woman's name on the list at the time of vaccination. These visits also presented an opportunity to provide the target women with basic information on tetanus and its prevention.

Manpower, training and supervision

The 31 vaccinators were newly qualified nursing school graduates awaiting their first government postings. All were natives of NTB and trained in the local nurses' training school. They were given a two-day orientation course on campaign strategy and methods, and their work schedule was explained. At the same time, they were provided with a standard vaccinator's kit and instructed in its use. Regular programme vaccinators and other health centre staff were not used in the campaign, except for eight district-level staff held in reserve in case of illness among the campaign vaccinators. These stand-by personnel also assisted in covering the district capital.

The village PKK cadres were briefed by subdistrict PKK volunteers prior to the start of the campaign on registration methodology, recording procedures and health education messages. Cadre supervision was carried out through the PKK's own network.

First-line technical supervision was the responsibility of the rural health centre doctor in each subdistrict, supported by the district chief of health services and his staff. Considerable supervisory support was also provided by provincial-level health services staff. Operational responsibility lay with the *camats* (subdistrict heads) in their respective subdistricts, with the *bupati* (district chief) providing coordination and support, including training of the *camats* in the district centre. Village headmen were responsible to the *camat* for coordination of all activities in their own areas.

Opening ceremonies

The campaign was officially opened on 7 January 1985 by Mrs Supardjo Roestam, wife of the minister of home affairs and president of the PKK. Also present at the opening ceremony were the director-general of communicable disease control, the governor of NTB, the UNICEF representative, the *bupati* of Central Lombok, the national directors of EPI and the chief of health services for NTB. The first vaccination was given by the director-general to the wife of the district chief of health services, herself a member of the PKK. The opening ceremony was also attended by all other *bupatis* from NTB and all health centre doctors and *camats* from Central Lombok.

Organization and logistics

Each of the nine subdistricts was completely covered before vaccinators moved on to the next one. The vaccinators were divided into teams assigned to the villages of the subdistrict, the size of each team depending on the number of vaccination posts in each village. Time schedules were prepared on the assumption that one vaccinator could vaccinate 100 women per day, though it was soon found that 200 per day was easily possible. The extra time thereby made available was used for follow-up. A total of 1,086 vaccination posts were required. The village headman was responsible for assigning vaccinators to specific posts; usually the more difficult and remote posts were assigned to male staff.

Vaccinators were usually housed in the village or *kliang* (hamlet, or settlement) where they were working. A living allowance of US$ 1.50 per day was provided, plus US$ 0.50 for local transport. The living allowance was handed over to the village headman, who was responsible for arranging local accommodation. Often vaccinators stayed in the headman's own house, and in many such cases payment was declined.

Transport was centrally planned to the extent that it was necessary to identify areas that would need support from the district. However, the organization of most local transport was left to the village headmen, who sometimes used their own motorcycles or hired locally available transportation to move vaccinators and their equipment from one post to another. Central Lombok is fortunate in having quite a good road system, and even byways are usually served by pony carts, which were used extensively. Vaccinators were moved from one subdistrict to another by transport organized by the district health services.

Volunteers from the Indonesian amateur radio organization established a base in each subdistrict as the vaccinators moved on. Radio contact was thereby maintained with the district capital and those vaccinators in the most remote areas. This system proved invaluable for rapid resupply of vaccine where targets had been underestimated, and for calling up supervisory support to solve local problems with minimum delay.

Cold chain

Vaccine was shipped from Jakarta in three batches during the course of the campaign to avoid overloading storage facilities in the province. It was then transferred to the district as required. Heavy-duty cold boxes were packed with enough vaccine for a given village. Ice was purchased from the district ice factory, which gave priority to campaign needs. The cold boxes were delivered by a truck (loaned by the *bupati*) to each village on the day before the vaccinators' arrival in the subdistrict. These boxes easily maintained their ice for five days, enough time to finish even the largest villages. Each day the vaccinators took an appropriate amount of vaccine and some of the ice from the box to their respective posts in vacuum flasks. Following completion of vaccination in a subdistrict, the used boxes were collected by the truck and transported back to the district. Any left-over vaccine was used as soon as possible.

Recording and reporting

At each vaccination post the PKK cadres were responsible for maintaining proper records. The names of any women who attended the vaccination session but had not previously been registered were added to the established list, and they were given an appointment card and serial number. At the end of each day, coverage totals were reported to the village headman and the health centre. Completed forms were kept in the village; only totals were reported to higher levels. These reports included not only the number of doses given and the amount of vaccine used (in vials), but also the reasons why those not vaccinated did not attend (sick, busy, moved away, etc.). Appointment cards were retained by the cadres at each post for redistribution a few days prior to the second immunization round about six weeks later.

The role of women

The Family Welfare Movement (PKK) is an organization dedicated to the promotion of social welfare activities at the village level. The movement carries out 10 main activities, one of which is health improvement. There is one cadre on average for every 20 households in a village, and this volunteer network is supported by motivating teams at all levels from the village up to the centre. At each level, the head of the PKK is the wife of the senior local official, the national president being the wife of the minister of home affairs. Family welfare in this way becomes a family concern even at ministerial level.

It was this system which was harnessed to motivate women to accept tetanus vaccination. In the case of NTB, particularly dynamic leadership was shown by the wives of the provincial governor and the district chief of Central Lombok. This system, allied to the mother-to-mother, friend-to-friend, neighbour-to-neighbour approach inherent in the PKK cadre structure, must receive a considerable share in the credit for the campaign's unqualified success.

The PKK was generally strengthened by its participation in the campaign, and the enthusiasm and confidence engendered by the experience is starting to be put to good use in supporting routine health activities. In addition to the contribution of women through the PKK, 40% of the vaccinators were also young women.

Coverage and cost

The 1980 census recorded almost 294,000 females in Central Lombok, about 140,000 of them between the ages of 15 and 49. As Table 1 shows, more than 135,000 of these women were enumerated as the target group in the nine campaign subdistricts and 126,000, or 93%, actually received both TT1 and TT2 vaccinations. Since exact age is often not known in this area, the PKK based its enumeration on fertility status—i.e., all women between first menstruation and menopause were included, regardless of age. In addition, previous vaccination history was ignored, and all women of childbearing age considered eligible.

TABLE 1

Vaccination results, Central Lombok district, 7 January - 11 April 1985

Subdistrict	Women enumerated	Round 1 vaccinated with TT1	% coverage TT1	Round 2 vaccinated with TT2	% coverage TT1+TT2	% Drop-out
E. Praya	9,124	8,441	92.5	8,096	88.7	4.1
Pujut	14,720	13,569	92.5	12,945	87.9	4.6
W. Praya	16,726	15,391	92.0	14,992	89.6	2.6
Jonggat	16,534	16,058	97.1	15,511	93.8	3.4
Pringgaraja	9,673	9,421	97.4	9,281	95.9	1.5
Batu Kliang	18,525	17,730	95.7	17,059	92.1	3.8
Kopang	13,323	12,835	96.3	12,502	93.8	2.6
Janapria	11,899	11,715	98.5	11,517	96.8	1.8
Praya	25,118	24,558	97.8	24,079	95.9	2.9
Central Lombok	135,642	129,728	95.6	125,982	92.9	2.9

About 3,500 women who were missed for one reason or another during the first immunization round received TT1 during the second round when other women were getting TT2. The second vaccination for this group will be provided through the regular health system.

As closely as can be estimated at the present time, the total cost of the campaign has been about US$ 50,000, or approximately US$ 0.40 per person fully immunized. UNICEF assistance has amounted to about US$ 32,000, or US$ 0.27 per capita.

These figures are somewhat misleading, however, because certain costs such as routine salaries of officials and health personnel and national level costs are not included. Vaccinators' salaries, however, are included in the estimate.

Conclusions and implications

Major strengths

By any relevant standard, the Central Lombok campaign achieved remarkably good results. Some of the major factors contributing to this success can be summarized as follows:

1) The PKK had an extensive, established network of volunteers at village and subvillage levels, and the aims of the campaign corresponded closely with PKK's own objectives—i.e., promoting family welfare. Thus, from the point of view of the immunization campaign, mobilization was largely a matter of a group of women talking with their friends and neighbours about a problem all of them had either experienced directly or at least knew of intimately.

2) The campaign was addressing a felt need. Casual interviews quickly confirmed survey data showing the omnipresence of neonatal tetanus in Central Lombok. It even has a local name—*babeak*.

3) A strong political will exists in NTB to reduce the infant mortality rate, by far the highest in Indonesia. As tetanus is a major contributor to IMR, local and central governments were anxious to support the campaign fully. It is clear that the Central Lombok exercise benefited from the active commitment and support of political leaders and administrators, both in Jakarta and in the province, which underlay and reinforced all other aspects of the project. General observation suggests that understanding of IMR and its complex causes is particularly sophisticated among officials at all levels in NTB. The friendly competition which developed between some of the *camats* and village heads in Central Lombok is an indication of the interest shown by local officials, and the extent of their personal involvement in the project.

4) The vaccinators were young and enthusiastic. Generally they enjoyed the opportunity to live in the villages and work with local government staff. They were also quick to learn and adapt, and presented a positive impression of the health services to the public.

5) Lines of responsibility were clearly laid down from the beginning, according to the strengths and recognized roles of the supporting sectors. The local government was the overall coordinator; it was closely involved in planning, and was really the lead sector. Each village arranged food, lodging and transport for its vaccinators and helped prepare the work schedules. (The vaccinators were handed over by one *camat* to another at a small informal ceremony each time they moved to a new subdistrict.) The PKK was responsible for the initial census, motivating the women and keeping them informed of immunization schedules, maintaining orderly procedures at the vaccination posts, and keeping detailed attendance and vaccination records. The Ministry of Health provided technical manpower, adequately trained, equipped and supplied with potent vaccine at the time and place decided upon by the local government and the PKK. In other words, each sector was doing the task it was most capable of doing, and—perhaps partly because each sector was closely observed by the others—did it extremely well.

Problems and shortcomings

The project was not without its share of problems, of course. For example, the involvement of different sectors with little previous experience of working together inevitably led on occasion to misunderstandings and problems of coordination particularly between governmental and non-governmental groups which worked together closely for the first time.

Regular vaccinators were deliberately not used to implement the campaign, to avoid disrupting their routine programmes. However, while the use of vaccinators from outside the regular health system in fact worked very well, this approach has the disadvantage of failing to utilize the knowledge and experience of regular staff and does not contribute to improving their morale. Ways need to be found to make better use of regular health personnel without unduly disrupting their routine duties.

Public education was a relatively weak element in the campaign. Little time and effort was devoted explicitly to it, and it was obvious from casual interviews that many women, including some PKK cadres, had only a very vague understanding of the specific purposes of tetanus immunization and its implications for their children. Since the final result was good, the lack of factual knowledge seems not to have been a serious hindrance. However, crash campaigns cannot be expected to replace routine immunization programmes, in which self-motivation must be counted upon to provide the major stimulus for appropriate behaviour. Without a fair degree of understanding of the link between immunization and disease prevention, it is unlikely that many parents will make a serious and sustained effort to have themselves and their children fully immunized.

Implications for routine immunization services in NTB

It will be important to monitor the extent to which the TT campaign experience contributes to improved performance of the routine immunization delivery system in NTB. While the basic structure of the system will remain much as it was before the start of the campaign, there is nevertheless a real possibility of improved utilization of existing resources and talents resulting from the concentrated learning experience which the project represented.

Several practices—the use of young and largely inexperienced nursing school graduates as vaccinators, detailed enumeration of the target population in advance of field implementation, and heavy reliance on a community-based group (the PKK) for registration, mobilization and follow-up—represent genuine organizational innovations which appear to have functioned well. Recognizing the impossibility of planning and supervising every detail of the operation from the provincial capital of Mataram, the project managers delegated much responsibility to local officials, community leaders and field staff. This helped to minimize many of the logistical problems usually encountered when a programme is centrally organized and directed.

No doubt at least some of the lessons implicit in this experience will be remembered and used again on other occasions.

The young vaccinators in particular may have benefited, not only in concrete, practical ways such as developing and refining their technical skills and learning to deal effectively with people, but also from their first-hand experience in a project that obviously worked smoothly and well.

In Central Lombok the enthusiasm generated by the success of the TT campaign has already led to efforts to strengthen the routine immunization programme. PKK cadres are starting to identify children eligible for BCG, DPT, measles and polio vaccination and are referring them to the nearest vaccination site. The *bupati* of Central Lombok has decreed that no marriage licence will be issued unless the woman can show a certificate proving that she has received full TT immunization.

Perhaps most importantly, the level of awareness and understanding of the benefits of immunization among administrators, from the governor to the village headmen and the people via the cadre system, has undoubtedly increased. This should lead to an increased demand for routine services.

While epidemiological research has proved the effectiveness of TT vaccine in virtually eliminating the risk of neonatal tetanus, it would be desirable to assess the effectiveness of the crash campaign through some sort of before-and-after comparison. Unfortunately, so few of the tetanus-caused deaths occur in either hospitals or clinics in Central Lombok that medical records are unusable as a basis for an impact evaluation. Any post-campaign comparative figure will have to be obtained, if at all, through a parallel survey in a year or so, after the other districts of Lombok have also achieved high TT coverage.

Case study

Immunization programmes in Brazil

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The Brazilian immunization experience is unique because of the size of the country, its population of 130 million, and the mixed immunization strategy that has been adopted.

Routine immunization services were recognized to be unable to reach a sufficiently high nation-wide coverage. Therefore, national poliomyelitis vaccination days based on social mobilization have been organized since 1980 to serve as a much needed complement to routine immunization. A 90% coverage, representing 20 million children, has been achieved and the incidence of poliomyelitis, the second highest in the world, has dropped to an insignificant level.

The question then arose two years ago whether this strategy of complementarity between routine immunization and national immunization days could be extended to other vaccines that are administered by injection and require more skilled personnel.

Expanded and updated version of working paper no. 9, presented at the WHO/EPI Global Advisory Group Meeting, held in Alexandria in 1984.

The case study below points to the factor which led to the adoption of mass simultaneous vaccination during the national poliomyelitis vaccinations days, the problems to be solved and the results obtained so far in the areas where this strategy has been implemented.

Communicable diseases still remain as important causes of morbidity and mortality in Brazil. The organization and implementation of control programmes are difficult tasks, even when appropriate technology is available, as in the case of vaccines. Some of the problems are:

a) a large population (130 million), unevenly distributed over a territory of 8.5 million sq. km;

b) rapid social and economic changes, followed by intense migratory movements to the periphery or urban centres;

c) deep contrasts between the regions of the country or within a given region or city, in regard to living conditions and access to basic health services;

d) insufficient coordination between a variety of public and private institutions that provide health services to the population.

These factors are important restraints to organizing and expanding programmes that are likely to reach the population of the whole country. Strong political, technical and operational support from the federal government is generally needed, although the state governments are administratively independent and responsible for carrying out programme activities.

The smallpox eradication campaign, carried out from 1966 to 1971 in Brazil, established the definite role of the Ministry of Health, at the federal level, in directing nation-wide immunization programmes. The extraordinary experience accumulated during that enterprise, which originally was organized as an independent executive structure, soon brought about the implementation of other strategies aimed at strengthening immunization activities through the basic health services. These included the organization of a national reporting system for selected diseases (1969), mass vaccination campaigns against poliomyelitis (1971-1973), and a large-scale simultaneous administration of vaccines (1972-1973).

The National Immunization Programme

In 1973, the Brazilian Ministry of Health established the National Immunization Programme (NIP), in order to integrate all activities being developed in this field. The NIP set forth national standards and procedures, and the federal government was made directly responsible for the purchase and distribution of the necessary amounts of vaccines. Responsibilities at the operational level were totally decentralized to the state health secretariats.[1]

The NIP is primarily directed towards the administration of measles, poliomyelitis (OPV), diphtheria-pertussis-tetanus (DPT), and BCG vaccines to children under 4 years of age and a standardized vaccination certificate is required nationally.[2] According to the current recommendations for the NIP,[3] the use of tetanus toxoid for pregnant women is also stressed. The recommended schedule for immunization of infants includes three doses of OPV and DPT at two-month intervals starting after the age of 2 months, one dose of BCG soon after birth, and one dose of measles vaccine as from 9 months of age.

Immunization activities on a routine basis are carried out primarily in public health units, although in a few instances private physicians are supplied with vaccines by state authorities. Immunization strategies have changed since the beginning of the programme. From 1975 to 1979, the programme was essentially routine-oriented, pursuant to a policy of expansion of basic health services.

The levels of immunization attained are estimated by means of the systematic compilation of vaccination records, which are broken down by months and by age groups, and a comparison of these data with the corresponding population data. Since 1975, this system has provided national estimates on immunization rates for children under 1 year of age. Until 1979, however, no significant results had been achieved. Rates of immunization had shown a progressive increase during the period, but did not top the 50% mark. In the north-eastern region, the immunization coverage attained was lower than 30% in 1979. Accordingly, epidemics of poliomyelitis continued to be reported throughout the country, even in areas showing high immunization rates. By that time, poliomyelitis had been well recognized as primarily a disease of early childhood caused by type I poliovirus (87% of the cases) and basically affecting unvaccinated individuals (76%) living in urban areas of the country (74%).

The reported incidence of measles showed a rising trend until 1980, when nearly 100,000 cases were recorded, a number that probably represented no more than 10% of the cases that occurred. Measles mortality ranges from 5,000 to 10,000 estimated deaths annually, of which nearly 3,000 are on record.

Expanded National Immunization Programme — the need for mass vaccination campaigns

Experience has shown that the structure of health services in Brazil, in spite of its expansion during the past few years, is not adequately organized to finance efficient routine immunization programmes, capable of maintaining high levels of immunization in a population of about 4 million newborn children every year. The mobilization of other sectors of the society is required to ensure the logistical support needed to reach important population groups that have no access to routine vaccination.

The technical simplicity of vaccine administration, its universal usage and easy acceptance by the population, and the possibility of attaining short-term impact on disease incidence, are some factors giving support to new approaches to vaccination strategies. The control of diseases preventable by immunization should not be merely a consequence of the general development of primary health care, but rather a feasible task deserving immediate action and the mobilization of existing resources, as a means of spearheading the implementation of other primary health care priorities.

In Brazil, the strategy of mass vaccination campaigns has been shown to be a successful way of promoting the extrasectoral support needed to overcome structural deficiencies of the health system, which demand profound changes in organization. The previous experience gained with the smallpox programme, as well as with other mass vaccination activities including meningococcal meningitis (1975), made the Ministry of Health confident in establishing a new plan of action in 1980, which was based on three main points:

a) strong governmental support at the national, state and municipal levels;

b) the shortest possible time of participation of extrasectoral resources;

c) the wide utilization of the mass communication media, using the time allotted for transmission of government messages on a large television and broadcasting network with nationwide coverage.

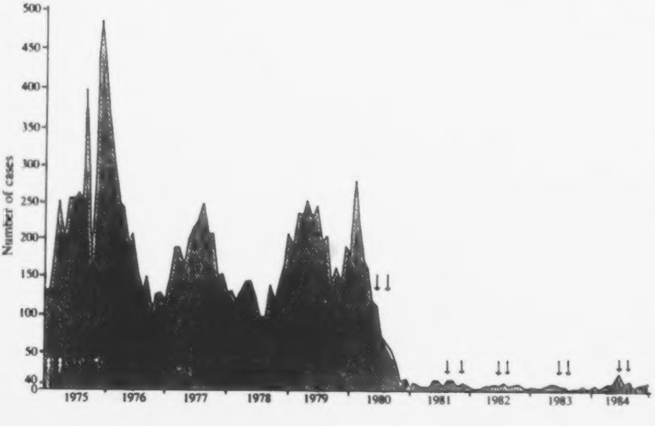
Three main strategies since 1980

1. National poliomyelitis vaccination days

For the period 1980-1984, national vaccination days to administer OPV were carried out twice a year in a single day, scheduled for Saturdays in the middle of June and August. This strategy was based on the large-scale use of volunteers and the extensive natural dissemination of vaccine strains. Children from birth to 4 years of age were eligible for vaccination, irrespective of their vaccination histories.[4]

The organization of the poliomyelitis vaccination days required the participation of government sectors at all levels and the involvement of other public and private institutions, with the support of an Interministerial Coordinating Group established under the Ministry of Health. Nearly 90,000 vaccination posts were used on each campaign day, representing an approximately ten-fold increase over the number of permanent health service outlets. Nearly 320,000 workers were involved in the operations, which were successfully repeated over five consecutive years (1980-1984), bringing the total to 10 campaign days during this period. Approximately 20 million children of all ages were reported to have been vaccinated on each of the campaign days, and estimated coverage exceeded 90% in the target age group.[5]

Incidence of poliomyelitis showed a steady downward trend soon after the first and second vaccination days of 1980, and it has been maintained since then. The previous epidemic cycles observed since 1975 (100 to 500 cases every four weeks) virtually disappeared (see Fig. 1). Likewise, between 1975 and 1980, the annual number of cases averaged 2,330 or 2.1 cases per 100,000 population, a situation that changed to 122 cases in 1981, 69 cases in 1982, 45 cases in 1983 and approximately 130 cases in 1984. Since 1981, incidence rates of poliomyelitis in Brazil have been below 0.1 cases per 100,000.



Note: The arrows indicate national vaccination days.

Fig. 1: Poliomyelitis cases, by 4-week periods, Brazil, 1975-1984
Source: National Epidemiology Division / SNABS, Ministry of Health.

2. Intensification of measles and DPT vaccination

Different approaches have been tried in order to increase coverage with vaccines administered by injection, which imply more expensive operations and limit the participation of voluntary personnel. Attempts to undertake mass vaccination over the years using jet injectors, mobile vaccination teams organized to work continuously throughout a region, the mobilization of local health units to work outdoors, or publicity calling the attention of the people to the importance of vaccination, have not been found to be efficient as long-term strategies for DPT and measles.

In 1981 and 1982, the state health secretariats were urged to develop appropriate strategies aimed at increasing the rates of measles and DPT vaccination, with the necessary support provided by the federal government. In the northern, north-eastern and west-central states, which showed the lowest vaccination coverages, mass campaigns were scheduled in a timely way according to local conditions and logistic support. The results, however, were far from reaching those attained on the poliomyelitis vaccination days.

The increasing number of doses administered of the measles vaccine seemed to have produced some impact on disease incidence in 1982, when the number of cases of measles decreased to the lowest level reported since 1976. In 1983, however, a new rise was observed. Likewise, the progressive increment of DPT vaccination between 1977 and 1983 corresponded to decreasing numbers of diphtheria cases reported during the period, although incidence remained at over 3,000 cases per year. Incidence of tetanus has shown light variations at around 3,000 reported cases per year, but there was a steady upward trend of pertussis incidence until 1982, suggesting improved reporting or problems related to the efficacy of the vaccine in use.

Furthermore, experience has shown that the implementation of special measles and DPT vaccination campaigns separated from the poliomyelitis vaccination days, represented an additional effort that could not be sustained as a long-term strategy.

3. Mass simultaneous vaccination as of 1984

As previously pointed out, the experience of national vaccination days to administer OPV has been unique in Brazil, in the sense that it has demonstrated that a systematic action, carried out through the mobilization of local resources, can be sustained and produce a definite impact on disease incidence. Therefore, this strategy must be continued as a basis for the control of poliomyelitis in the country.

The administration of other vaccines simultaneously with OPV during the national campaigns was considered in 1983, as a means of improving coverages for measles and DPT by taking advantage of the attendance of children in the eligible age groups.

Although confidence had been gained in regard to the operation of nation-wide poliomyelitis campaigns, the approach of mass simultaneous vaccination was considered with caution, because:

1) administration of the DPT and measles vaccines should aim to complete dose schedules, while OPV is administered regardless of the previous number of doses received by the child;
2) there would be differences in the eligible age groups for each of the three vaccines—OPV given from birth, DPT starting at 2 months and measles at 9 months of age;
3) skilled personnel would be required to administer injectable vaccines;
4) while there is a scientific rationale for the usage of OPV in mass campaigns (substitution of circulating wild poliovirus), this is not the case for other vaccines;
5) unlike poliomyelitis, no immediate impact on measles, diphtheria and tetanus could be expected, once a significant proportion of the cases occur in older age groups;
6) DPT and measles immunization coverages were not uniform among the states, some of them having reported high immunization rates during previous years;
7) fulfilment of the three-dose schedule recommended for DPT would require an additional annual vaccination day;
8) social mobilization and social communication strategies would be more complex than for the national mass poliomyelitis campaign.

These factors had the following operational implications:

- persons with the skills to give injections would need to be recruited from the health sector or the community, and in some cases training of lay personnel would be necessary;
- existing vaccination posts would need to be re-evaluated, as more space, better accommodation and organization would be needed for the selection of children according to indicated antigens; the necessary facilities for DPT and measles administration, evaluation and recording on vaccination cards, attention to contraindications, and orientation about side-effects would also be required;
- enormous amounts of extra supplies would be needed, particularly of disposable syringes, which become absolutely necessary in such a strategy;
- parents would have to bring their children's vaccination cards (not required for OPV) so that the dose schedules could be followed.

In 1983, a pilot project was carried out in one state of Brazil (Rio Grande do Norte) to demonstrate its feasibility. Since no major operational problems were detected, a proposal was made by the Ministry of Health to all state health secretariats, to give measles and DPT vaccines during the national vaccination days scheduled for June and August of 1984.

The primary objective was to increase coverage in younger age groups, specially in areas where routine vaccination was clearly insufficient. Minimum modifications needed to be introduced into the structural organization set for polio immunization in relation to the distribution of vaccination posts so that the access of the population would not be affected. It was decided that a third annual campaign day would not be recommended, for operational reasons. The decision to embark on the programme was left to the states, but those in the northern, north-eastern and middle-west regions were urged to do so, as priority areas for the proposed approach.

The proposed plan for measles vaccination established the administration of one dose during the first campaign on 16 June 1984, taking into account the seasonal patterns of the disease in Brazil, which showed a typical rise during the second semester of the year. The eligible age group included children from 9 to 23 months of age.

In relation to DPT, vaccine would be administered to children from 2 to 11 months of age, during the two campaign days. The third dose, which is specially needed for the pertussis component, would be administered through the permanent health services on a routine basis.

Figure 2 shows an ideal flow-chart suggested for the vaccination posts, to facilitate the selection of the eligible children and the administration of the three vaccines, according to different age groups.

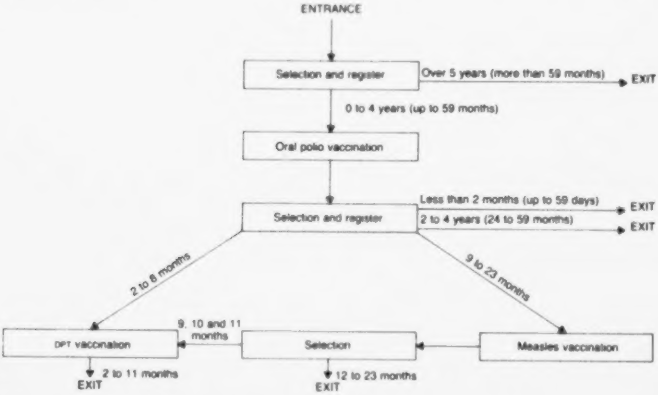

ENTRANCE
Selection and register
Over 5 years (more than 59 months)
EXIT
0 to 4 years (up to 59 months)
Oral polio vaccination
Selection and register
Less than 2 months (up to 59 days)
EXIT
2 to 4 years (24 to 59 months)
EXIT
2 to 8 months
9 to 23 months
DPT vaccination
9, 10 and 11 months
Selection
Measles vaccination
2 to 11 months
EXIT
12 to 23 months
EXIT

Fig. 2: Suggested flow-chart for the simultaneous administration of polio, measles, and DPT vaccines, according to different age groups

Social communication strategies anticipated adjustments to be made at the state level, because the administration of measles and DPT vaccines was not uniform in all states. The Ministry of Health provided the state programmes with sets of materials related to measles and DPT vaccination (video-tapes, records, posters and folders), to be used according to their specific needs and possibilities. Polio vaccination continued to be the main focus of federal government utilization of mass communication media.

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Results of mass simultaneous vaccination in 1984

Mass simultaneous vaccination was performed as proposed in 19 of the 27 states of Brazil, covering the north-eastern, northern and middle-west regions of the country, which had been showing the poorest results in regard to routine vaccination during previous years. Five of the seven south-eastern and southern states introduced measles vaccination only. In some of them only selected municipalities were included, as a result of lower coverages in those particular areas or lack of human resources to develop the strategy state-wide.

A total of 2.1 million children received the measles vaccine during the campaign day held on 16 June 1984, of which 1.6 million were in the target 9 to 23 months age group. This represented almost half the estimated population for this age group in the states included in the programme. DPT vaccine was given to nearly 1 million children on each of the two campaign days, covering the target 2 to 11 months age group.

As vaccination was carried out selectively, according to the dose schedules, there were difficulties in evaluating the increases in coverages attained on the individual campaign days, as the target population could not be very clearly determined. However, a follow-up analysis of coverages achieved at the end of the year, which included routine vaccination as well, showed important increases in the three major priority regions.

Measles vaccine coverage in the northern, north-eastern and middle-west regions increased from 48.1%, 45.6% and 55.6% in 1983, to 68.3%, 64.1% and 69.2% in 1984 respectively, referring to the under 1-year age group (see Fig. 3).

Coverages for DPT showed also a significant increase in those particular regions. Figures for 1984 showed 50.3%, 64.3% and 73.9% coverage in the northern, north-eastern and middle-west regions, as compared to 37.3%, 40% and 43% reported respectively for 1983 (see Fig. 4). It is important to mention that no increase was observed in the southern and south-eastern regions in 1984, where simultaneous vaccination with DPT was not carried out.

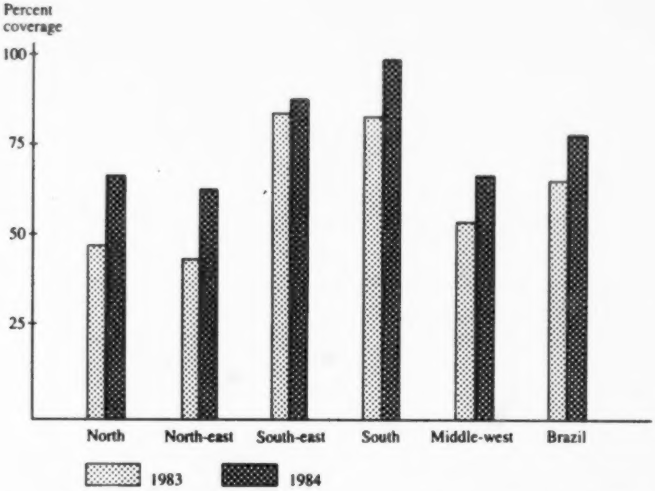

Fig. 3: Estimated measles vaccination coverage in children under 1 year of age, by greater regions, Brazil, 1983-1984

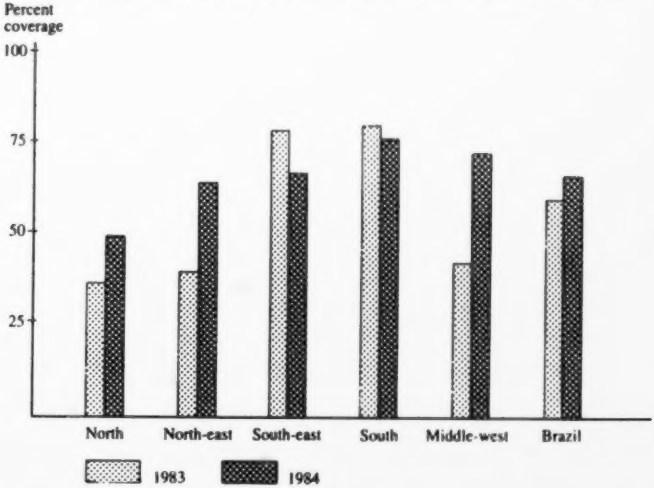

Fig. 4: Estimated DPT vaccination coverages (third dose) in children under 1 year of age, by greater regions, Brazil, 1983-1984

Epidemiological surveillance

National notification of diseases preventable by immunization started in 1968, consisting of the number of cases reported by state health secretariats through weekly telegrams. In 1975, surveillance of poliomyelitis was improved to provide comprehensive information on the epidemiological patterns of the disease in Brazil, which was of outstanding importance for the implementation of the poliomyelitis vaccination days. Since 1982, a set of "surveillance guides" for selected diseases have been in use throughout the country, after discussion with the state epidemiologists.[6]

Surveillance of poliomyelitis has been the subject of special attention in monitoring the immunization programme. It includes the immediate notification and investigation of suspected cases, defined as those in which the patient presents acute flaccid paralysis. Laboratory support is provided by a network of nine institutions in different parts of the country, under the technical coordination of a national reference centre for enteroviruses. Investigation of the cases includes assessment of residual paralysis 60 days after onset of the disease and recording of relevant data on a standard form. A suspected case of poliomyelitis is accepted when the diagnosis cannot be ruled out by clinical, epidemiological, or laboratory evidence. Detailed information and instructions for the surveillance of poliomyelitis have been published and disseminated through public health services in Brazil.[7]

In spite of the progress achieved, continued transmission of wild poliovirus persists in some parts of the country, particularly in the north-eastern region where most outbreaks have been detected since 1981. A detailed revision of the surveillance system for poliomyelitis is now under way, as part of the plan of action proposed by PAHO/WHO in 1985, aiming at the eradication of indigenous transmission of wild poliovirus in the hemisphere by 1990.

Many problems persist in regard to measles surveillance, mainly due to variations in notification sources from one state to another according to the extent of reporting of uncomplicated clinical cases. Nonetheless, it has been noted in recent years that the proportion of cases in older age groups has increased, probably denoting the effect of measles immunization programmes. The need to investigate outbreaks of measles has been stressed as a means of providing better knowledge on the epidemiological patterns of the disease, and of measuring vaccine efficacy and improving control measures. An epidemic investigation carried out in the Federal District in 1983 provided definite support to starting measles immunization at 9 months of age.[8]

Vaccine supply

The majority of biologicals needed for disease control programmes in Brazil are supplied by national manufacturers. Six official laboratories linked to federal or state governments manufacture the following biologicals, which are purchased by the Ministry of Health and distributed free of charge to the state health secretariats in accordance with programme needs:

a) vaccines: measles, DPT, tetanus toxoid (TT), diphtheria-tetanus adult type (dT), BCG, human and canine rabies, yellow fever, meningococcal meningitis A-C, typhoid fever and cholera;

b) sera: tetanus, diphtheria, rabies.

Until 1984, only poliomyelitis vaccine (OPV) was totally imported. Measles vaccine production started in 1983 through an agreement with the Government of Japan, and no importations have been made since then. Nearly 150 million doses of all kinds of vaccines are needed to implement disease control programmes, at an approximate cost of US$ 6 million in 1984.

In 1981, a national quality control laboratory was set up, and at this time, practically all biologicals come under strict control, including those that are imported. This undertaking gave rise to a profound revision in manufacturers' facilities and procedures, which in some cases led to interruptions of production and a consequent need for importation, mainly of DPT, TT and derived sera. A national programme aiming at the country's self-sufficiency in the production of essential immunobiologicals is in preparation for 1986.

The system of vaccine distribution includes the maintenance of a central storage and control of stocks at state level, where considerable investments have been made to improve storage conditions. There is a wide variation in conditions of the cold chain from one state to another.

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Case study

The national immunization campaign of El Salvador

Against the odds

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The success of the recent immunization campaign in El Salvador despite the civil war has shown how much can be achieved in the face of seemingly insurmountable odds. Both the government and the guerrillas agreed that the goal of immunizing children was an ideal transcending all differences, and that immunization should be taken to all parts of the country and all Salvadorian children.

The campaign had the personal support of the head of state, and the Church, UNICEF, PAHO/WHO, ICRC and other organizations worked with the parties to the conflict to arrange for the campaign to proceed unhindered. As a result of the efforts of all parties concerned, the three national immunization days, held on 3 February, 3 March and 21 April 1985, were transformed into "days of tranquillity" as planned.

This case study describes how the campaign was organized, and presents an assessment of its achievements.

Assignment Children, vol. no. 69/72, 1985

The decision process leading to the campaign

In July 1984, the president of El Salvador met with the secretary-general of the United Nations and with James P. Grant, executive director of UNICEF, in New York. The suggestion was made that the Government of El Salvador should launch a child immunization campaign resembling that of Colombia. Three alternatives were discussed: an immunization campaign against the six major communicable diseases, aimed at children under 1 year of age; national immunization days against poliomyelitis; or national immunization days against the six main diseases aimed at children under 5 years of age. (The original plan included vaccination against tuberculosis, but this was abandoned as being too complex a vaccine to administer.)

In September 1984, it was proposed that an evaluation team be formed to study the feasibility of the project. The team was to evaluate the regular immunization programme, the current coverage and the number of children in need of immunization, and the political feasibility of carrying out such a campaign, given the political and military situation in El Salvador.

The evaluation of the existing EPI was carried out between 5 and 24 October 1984 by PAHO/WHO, UNICEF and the Ministry of Health. The evaluation showed that an immunization campaign was feasible in spite of the political difficulties that have troubled the country for the past five years. The study also suggested that the greatest need was to improve immunization coverage in children under 3 years of age.

The evaluation team presented their findings to the Ministry of Health along with a proposal for a three-year plan of action, which suggested national immunization days on three Sundays—3 February, 3 March and 21 April 1985—accompanied by large-scale social and political mobilization to ensure that children under 3 years of age would be immunized. The plan of action also suggested that international organizations should provide technical and financial assistance to guarantee the success of the project. Finally, the president of El Salvador met the evaluation team and was informed of the results and the plan of action; he immediately approved the project.

Organizational structure of the campaign

The Executive Committee

The plan of action recommended the creation of an ad hoc body to organize the national immunization campaign. The first decision was to appoint an executive coordinator with enough political stature to carry out the project in a short period of time. The coordinator was to be assisted by a national Executive Committee *(Comité ejecutivo)* made up of the unit chiefs of the Ministry of Health. At the regional level, the Ministry of Health designated the regional health directors as executive coordinators and established regional executive committees, the composition of which mirrored the structure of the national committee, as well as including representatives from other ministries and private organizations (see Fig. 1).

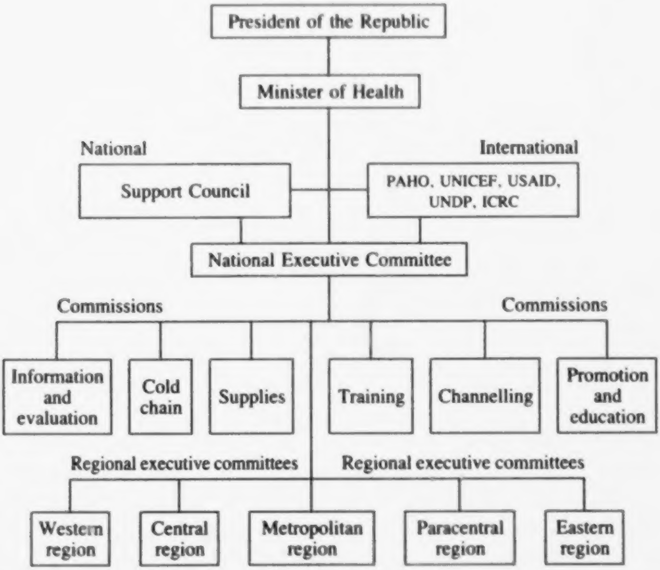
President of the Republic
Minister of Health
National
International
Support Council
PAHO, UNICEF, USAID, UNDP, ICRC
National Executive Committee
Commissions
Commissions
Information and evaluation
Cold chain
Supplies
Training
Channelling
Promotion and education
Regional executive committees
Regional executive committees
Western region
Central region
Metropolitan region
Paracentral region
Eastern region

Fig. 1: Immunization campaign organization chart, El Salvador, 1985

The Executive Committee was created by resolution of the Ministry of Health on 30 October 1984, and both UNICEF and PAHO/WHO took part in its meetings. Specific commissions handled channelling, training, supplies, the cold chain, information and evaluation, and promotion and education.

The fact that the Executive Committee included representatives of key units in the Ministry of Health guaranteed maximum participation by ministry personnel. Similarly, linking the committee with the regional and local committees facilitated communications, provided feedback, and ensured that decisions made at the central level were carried out.

In spite of initial scepticism, given the severe economic, political and social difficulties of a country at war, the Executive Committee proved efficient and industrious.

From the outset, the Executive Committee faced enormous challenges: setting up a training system within a very short time for personnel at every level of the national health service and in other organizations and branches of government; establishing a channelling system to locate and register eligible children in a country that had never had one; completely reorganizing the cold chain; and creating a system for nation-wide information, communication and mobilization. The financial difficulties of the Ministry of Health and the government also entailed an all-out drive to obtain funds.

The committee met daily to review and record progress. Both before and during the campaign, these daily meetings generated an exceptional working atmosphere which helped to smooth out some initial friction. The rapport between the members of the committee was excellent and the same was true of the regional and local health committees.

The Support Council

The plan of action also proposed that all branches of government and the private sector support the immunization campaign. It therefore recommended the setting up of a national Support Council *(Comité de apoyo)* involving a variety of organizations concerned with health: the ministries of Agriculture and Livestock, Education, Public Works, Defence and Public Security, the Interior, and Finance; the Salvadorian Social Security Institute; the Military Hospital; the Catholic, Adventist and Evangelical Churches; the Salvadorian Red Cross; the International Committee of the Red Cross (ICRC); the Green Cross; the Boy Scouts; Rotary Clubs; 20-30 Clubs; Lions Clubs; and the Association of Media Publicists. PAHO/WHO, UNICEF, USAID and UNDP were also part of the council and provided technical and financial assistance. This group worked well together, with the necessary flexibility and speed.

The Support Council held weekly meetings chaired by the minister of health in collaboration with the executive coordinator. At each session, like the Executive Committee, the council reviewed progress and discussed needs raised by the regional executive committees. Representatives from the regional committees attended several of the meetings of the Support Council, to ensure that decisions calling for intersectoral coordination were carried out, or to propose new activities. The Support Council has in fact provided the government with an example of how all sectors in the nation can come together to resolve problems that affect the whole community. Retaining this council for other health activities should be considered as a matter of priority.

Coverage

The original goal was to immunize 400,000 children under 3 years of age—roughly 80% of all children under 3 years of age in the country—against diphtheria, pertussis, tetanus, polio, and measles; the plan also included tetanus toxoid injections for women of childbearing age who requested them. In December 1984, the age group was extended to cover children under 5 years of age. This change of plan stemmed from the channelling surveys, which had found that the largest number of unprotected children was in the 3 to 5 year age group.

The full target of 400,000 was not reached. In total, 217,230 children were vaccinated on the first day; 262,443 on the second, and 241,223 on the third—a total of 720,896 child attendances for vaccination (see Table 1). Overall, the campaign increased the proportion of children vaccinated against

TABLE 1

Number of child attendances for vaccination, by day and by region, El Salvador, 1985

	No. of child attendances			
Health region	first day	second day	third day	
Western	44,781	56,625	52,625	
Central	30,212	39,519	36,432	
Metropolitan	46,832	49,586	42,722	
Paracentral	33,994	42,410	39,772	
Eastern	61,411	74,303	69,672	
Total	217,230	262,443	241,223	
Grand Total				720,896

Source: Information and Evaluation Commission, *National Immunization Days*, 1985.

diphtheria, pertussis and tetanus by 27.5%, against polio by 29%, and against measles by 29%. This would imply that the current coverage of the children identified through the channelling process (357,986 children, of whom 312,578 were referred for vaccination) is approximately 69% for DPT vaccine, 60% for polio and 70% for measles. But it should be remembered that the figures for children protected by immunization before the campaign cannot be considered reliable because of defects in the cold chain. The campaign figures also show that vaccines were given in greater numbers to children over 1 year old in rural areas (these children received 61% of the DPT shots, 62% of the polio vaccinations and 61% of the measles shots). This would indicate that coverage before the campaign had tended to be concentrated in urban areas. On the third day of the campaign, some 40,000 women were given tetanus toxoid injections.

A variety of setbacks restricted the coverage: a shortage of vaccination posts in many places; lack of transport; not enough vaccinators to cope with unforeseen demands; and rigid application of the guidelines (for example, some children were turned away because they did not have their vaccination card, and some situations arose that were not covered by the guidelines). In addition, some of the information from the channelling research could not be used effectively in planning the vaccination posts because of a delay in processing the data.

These problems were mostly resolved by the second and third immunization days.

In very few instances was the campaign affected by the military conflict. When this did happen, the sites were visited a few days later.

Financing the campaign, a complex fund-raising task

When the government approved the immunization plan it was in no position to undertake a task requiring resources estimated at over US$ 1 million: the administrative structures were not in place and there were no funds for the purpose. The minister of health and the executive coordinator immediately met with the minister of finance to marshal the extra funding. Only some of the funds could be guaranteed from the start. Further funding was needed to start the training of personnel; to begin producing the printed materials and radio and television spots to promote the immunization days; to provide per diems, transport, fuel, and training materials; and to buy supplies in time for the campaign. In other words, a complicated fund-raising task had to be completed in a very short time.

As a first step, funds were obtained from UNICEF and Rotary International to purchase the vaccines. PAHO/WHO quickly promised the necessary technical assistance. Further funding came from a USAID loan to stimulate health services. Additional UNICEF funds were used to purchase cold chain equipment, syringes, alcohol, surgical cotton and medical supplies. Later in November, UNICEF again provided funds to finance the training.

Financial and technical assistance were also needed for the channelling operation, to begin the area surveys, produce country-wide census maps and carry out field tests. The funds were obtained quickly enough for the channelling to go ahead without major delays.

The *Centro de Producción de Comunicaciones Educativas* (CEPROCE), the interdisciplinary group formed to handle promotion and education, needed considerable financial assistance as well as technical support. UNICEF and UNDP agreed to produce all the materials for the publicity campaign; USAID channelled

TABLE 2

Total cost of the immunization campaign by category of expenditure and by region, El Salvador, 1985 (in colones)*

Category	Western region	Central region	Metropolitan region	Paracentral region	Eastern region	National total	% of total
Personnel	632,651.14	225,670.46	306,294.00	311,553.54	1,106,745.59	2,582,914.73	32.2
Medical supplies (exc. vaccines)	118,221.47	85,298.68	100,649.50	90,138.36	152,353.22	546,661.23	6.8
Other supplies	18,105.68	6,458.41	8,765.75	8,916.27	31,673.67	73,919.78	0.9
Equipment	6,569.03	3,962.48	5,470.02	5,347.15	6,771.91	28,120.59	0.4
Buildings	2,692.11	1,401.48	2,084.52	1,144.92	2,615.81	9,938.84	0.1
Transport	523,053.81	352,436.31	317,420.10	273,482.84	315,630.81	1,782,023.87	22.2
Stipends	218,195.55	77,813.66	105,637.98	107,451.94	381,706.00	890,805.13	11.1
Other	517,704.43	184,668.17	250,643.22	254,947.09	905,659.94	2,113,622.85	26.3
Total	2,037,193.22	937,709.65	1,096,965.09	1,052,982.11	2,903,156.95	8,028,007.02	100.0
% of total	25.38	11.68	13.66	13.12	36.16	100.00	

* During January to June 1985 the exchange rate averaged 4 colones to US$ 1. Figures include external funding.

TABLE 3

External funding for the immunization campaign, El Salvador, 1985, (in us dollars)

Activities	Funding sources							
	UNICEF					UNDP	PAHO/WHO	Total
	Adm. budget	General funds		Supplementary funds				
		General	IMR fund	Swiss Gov't	USAID			
1. Vaccines			120,640					120,640
2. Medical supplies					4,202			4,202
3. Cold chain equipment		10,867	20,818	50,141				81,826
4. Channelling		56,759	7,403		78,513			142,675
5. Training/supervision		1,234	29,590		10,669			41,493
6. Technical assistance		6,211	16,374				96,491	119,076
7. Publicity promotion			55,000		24,488	15,000		94,488
8. Transport					5,402			5,402
9. Administrative support	27,408					1,996	29,266	58,670
10. Miscellaneous			59,235		3,797			63,032
Total	27,408	75,071	309,060	50,141	127,071	16,996	125,757	731,504

Notes: 1. Includes DPT, polio, measles and tetanus toxoid. 2. Includes medical supplies except vaccines. 3. Does not include cold chain equipment previously donated by USAID. 4. Stipends for channelling personnel. 5. Training for personnel in each vaccination post and channelling personnel. Supervision of vaccination posts on each vaccination day. 6. In the areas of channelling, cold chain, publicity and promotion, and evaluation. 7. Materials and training for public and educational promotion. 8. Includes vehicles, vehicle repair, fuel and freight costs. 9. Includes personnel, telephone and telex, secretarial services and office costs. 10. Includes contingency items, building space, stationery, and non-medical supplies.

funds through UNICEF to finance radio and television spots; and the Benjamin Bloom Foundation contributed more than 50% of the funds needed to maintain the promotion and education activities. Two private enterprise groups—the Association of Media Publicists and the Salvadorian Association of Radio Stations—donated free air time and space to match the slots already purchased on radio, television and in newspapers, so doubling the quantity of messages.

Overall, the financing for every aspect of the campaign was obtained slowly but surely as the programme developed. Even though funding had not been guaranteed from the start, lack of resources never hindered the work. UNICEF provided financial support at every stage, and PAHO/WHO and UNDP administered the funds with speed and efficiency.

Tables 2 and 3 give the costs of the immunization campaign by category of expenditure and region, and by funding source. The total cost was over US$ 2,007,000, calculated at 4 colones to US$ 1, which was the average exchange rate between January and June 1985. UNICEF provided the largest share—about one-third. (This covered allocations to El Salvador from supplementary funds, purchases made outside the country, and also the administrative costs of the UNICEF Area Office in Guatemala.)

Personnel costs, chiefly the salaries of national personnel involved in the campaign, accounted for 32.2% of the total expenditure.

Taking as a base the figure of 720,896 child attendances, the cost per attendance came to 11.7 colones or US$ 2.91. At this point, there is not enough information to calculate the cost per child fully immunized, but the coverage evaluation will soon provide detailed information on the number of children fully immunized during the campaign and hence the costs per capita for full protection.

Planning and organization

The immunization campaign was not originally perceived as being part of the national immunization programme. It originated in the political will of the government to tackle the critical health situation of the country's children.

The Executive Committee and its commissions drew up the programme as an emergency measure. For that reason, not all needs could be foreseen, and adjustments and corrections had to be made as the programme advanced.

In the area of communications and public education, the work of CEPROCE was based on KAP surveys regarding immunization, and on field testing of the messages and materials it was producing. This ensured appropriate messages for attracting people to the vaccination posts. CEPROCE was a highly motivated multidisciplinary group which showed considerable capacity to grow and acquire new experience and technical skills in the production of audiovisual materials.

Supplies and transport

An efficient supply system had to be designed so that supplies would arrive on time. Unfortunately, some supplies from outside the country arrived late, which created complications. The most distant regions and those with the greatest communication difficulties were given priority and were the first to receive supplies, either by air or by land.

Transport in general was difficult because of the shortage of vehicles at all levels and in all branches of government. The vehicles also had to be allocated between the different regions and identified in order to protect them. All groups in the country were informed of the markings of immunization campaign vehicles so that these could move freely throughout the countryside. On average, 250 vehicles were used on each day. They belonged to the Ministry of Health, other ministries or private organizations, or were volunteered by private individuals.

The cold chain

The cold chain received the highest priority since the whole system had to be ready to store and distribute the vaccines in good order at the right moment at all levels of the health system. The Ministry of Health did not have central cold storage capable of guaranteeing vaccine potency, but in less than two months of intensive work, regional cold-storage units had been set up and were inaugurated 10 days before the first immunization day.

Because of a delay in receiving King-Seeley vacuum flasks, the Ministry of Health took up the offer of Rotary International to supply 3,000 flasks produced locally according to WHO specifications and passed by the Ministry of Health and PAHO/WHO. Vaccine thermometers were widely distributed to help check vaccine potency even at the local vaccination posts.

Information and evaluation

The information and evaluation team designed all the informational systems for the campaign and speeded up certain aspects of its evaluation. This group also analyzed the potency of the vaccines used on the three immunization days.

The team also designed the information system for each immunization day, which made it possible to announce on the day itself the number of children vaccinated throughout the country. The team pre-tested the forms used for this process to ensure a good data base; regional personnel in charge of statistics were trained in handling the forms; and they, in turn, trained the vaccination and registration personnel at the vaccination posts. This advance information system, relayed by telephone or cable, functioned efficiently from the first day, and the team was able to announce surprisingly accurate results.

The information and evaluation team is currently evaluating the overall coverage achieved, using 80 cluster samples covering about 6,000 families.

Political dimensions

From the beginning, the government committed itself to carrying out the immunization campaign as a national effort with all groups included, and as a fully non-partisan activity.

Some of the 1985 elections for parliamentary deputies and mayors coincided with the national immunization days. When the dates were originally set for the campaign, it was recognized that most of the work would be carried out in an atmosphere of political tension; there was a risk that the vaccination workers would be seen as partisan, which could have affected coverage and might also have deterred some non-political groups from taking part. But other dates also carried problems, chiefly because of the rainy season but also due to the harvest, with its concomitant migration of families. So, if the immunization campaign had not been carried out when it was, it would have had to be postponed until 1986.

Some opposition groups tried to discredit the immunization campaign by claiming it was an electoral manœuvre. This occurred chiefly during the second immunization day, but in the event, the largest number of children of the entire campaign was immunized on that day. Some members of the party in power wanted to take political advantage of the immunization campaign, but the government forbade them to do this.

Another noteworthy aspect of the campaign was the effort to carry it to the *whole* nation and to *all* Salvadorian children. The armed conflict, which has persisted for several years, created a difficult setting for the campaign, and UNICEF, PAHO/WHO and the ICRC worked to encourage either a dialogue or a truce between the armed groups, so that the vaccinating could go on unhindered. The international agencies kept in continuous contact with the different governmental bodies and with the Archbishopric of El Salvador, whose staff were acting as mediators, so that all sides would receive the information needed to convince them to back the campaign. It soon became clear in the many discussions that a formal treaty was out of the question, since both sides viewed signing a treaty as an indication of weakness. In the end, an unsigned agreement was reached (which some called "days of tranquillity") by which both groups agreed not to encourage armed aggression on the immunization days provided the other side did the same. The agencies were well aware of how tenuous this agreement was and stood ready to begin or sponsor new talks at any moment, to ensure the free movement of health personnel throughout the country.

It emerged from the general discussion that various areas controlled by guerrillas would be better served by neutral ICRC personnel. These areas were listed for each immunization day, and all groups informed.

Special lists were also drawn up of the areas in dispute, or in potential dispute, where Ministry of Health personnel were due to work on the immunization days. A week before the first day it seemed that some of these might be bypassed because the health workers were reluctant to enter them; but the government decided that the cause of Salvadorian children took precedence and that the campaign should reach as many of these areas as possible. The problem was resolved when the immunization personnel received reassurances—particularly from Church authorities—that the guerrillas would respect the agreement.

In the event, the campaign was carried through despite the fragility of the "days of tranquillity" agreement. There were a few small incidents which did not hinder the programme as a whole.

Senior officials from other governments and from the United Nations as well as well-known scientists came to observe the immunization days; this undoubtedly contributed to maintaining a stable political environment during the immunization campaign.

In brief, the whole campaign took place in very delicate circumstances, hence the importance of the fact that the campaign was identified not as a direct government activity but rather as a national task involving all sectors of the population, without distinction of religion, political affiliation or geographic location, for the ultimate good of Salvadorian children.

The role of the media

The president of the republic officially inaugurated the campaign on 15 December 1984. The opening move was a seminar attended by journalists representing the national communications media, who were briefed on the campaign itself, the advantages of immunization, and the importance of the role of the media. From that day on, the contacts with journalists grew stronger. The press published news of the campaign every day, and features produced by individual journalists or the authorities were broadcast on radio and television. The mass of information that resulted, coupled with a paid promotional campaign, came close to competing with the electoral coverage which was going on at the same time. The campaign organizers also held frequent press conferences and meetings with reporters and broadcasters.

The atmosphere

The immunization campaign was launched on 3 February 1985, and continued on 3 March and 21 April 1985. These days were declared "national days" and the entire country was encouraged to participate. This event, usually considered to be strictly technical and sectoral, ultimately became a kind of universal festival. How was this atmosphere created?

On each national day at 8 A.M., the campaign was launched from the Presidential Palace. It started with the president's address to the nation on the theme "life and peace for children". Then the president himself vaccinated a few selected children with oral polio vaccine. The ceremony received wide media coverage and was broadcast live on television and radio.

The participation of top-level national dignitaries, from official or private circles, and the presence of representatives from both international bodies (James P. Grant, executive director of UNICEF, attended the first and third days) and foreign countries added prestige and importance to these "festivities".

The impact of the official ceremony, broadcast in the homes and streets of the capital and all other cities, was reinforced by parades, posters, stickers, streamers, orchestras and singers at street corners, loudspeakers and mobile units. The extent and cheerfulness of these celebrations could not but strike the imagination of any outside observer, especially on the first and second days.

The combination of prestige provided by government support, information saturation, joy and cheerfulness, created an enthusiasm that enveloped the entire country. The creation of such an atmosphere was certainly unique and remarkable. For the Salvadorians there was little doubt that the theme "life and peace" became a happy reality. Although its effects defy quantification, this atmosphere certainly contributed to the large number of children brought to the health posts.

Implications of the campaign

Some answers to two key questions

The success of the El Salvador campaign should make it possible to answer two key questions which were raised from the start. Is it possible to carry out an immunization campaign in a context of war? And was the campaign an important step towards improving children's general protection against vaccine-preventable diseases?

The first question has several answers:

1) The immunization campaign worked efficiently because it was backed by political commitment at the highest level, which spread progressively to other levels of government.

2) The mechanisms created to carry out the campaign functioned smoothly. The presence of the minister of health at the meetings of the Executive Committee and of the Support Council indicated the importance which the ministry attached to the campaign.

At the international level, very close contact was maintained both with the international news networks represented in the country and with the special teams assigned to cover the campaign. News about the immunization days was disseminated internationally and attracted considerable interest. As many journalists pointed out, it was the first news to come out of El Salvador in a long time that had to do with the saving of lives and not with death and destruction.

3) The continuing dialogue with the armed opposition groups, through the mediation of the Archbishopric, ensured the guerrillas' willingness to support the national effort, which was demonstrated during the campaign itself when assistance was needed in communities under their control.

4) Mobilizing the media generated a change in opinion and attitude which greatly helped the campaign. Such an intensive and productive health activity had not been seen for many years, and in that sense the campaign left its mark both on the population and on the various institutions involved.

5) The support of UNICEF, PAHO/WHO and UNDP, and the assistance of USAID, Rotary International, the ICRC and other international organizations were key factors in the success of the campaign. The active presence of these agencies in the country helped to create a positive political atmosphere and inspired confidence at the international level. The technical and financial help received from these organizations was also crucial, given the precarious financial situation of El Salvador.

The question of whether the campaign has substantially contributed to improving immunization coverage for the children of El Salvador can be answered in various ways:

1) In the past, immunization campaigns have not been successful either because of political manipulation or because of technical shortcomings. Despite its short preparation time (which may in fact have been an advantage), the campaign in El Salvador rested on solid technical and political foundations.

2) The immunization campaign in El Salvador was designed from the start not only to carry out immediate vaccination activities, but also to establish permanent structures which would serve as the basis for a continuing EPI. The campaign has laid the institutional and physical foundations for an adequate cold chain; health personnel at all levels have been trained; new guidelines have been established and personnel trained in applying them; and the health services have come into closer contact with the community, giving health personnel a better understanding of community realities and problems—some regions have already programmed further health activities in areas which for years have had no health services at all. Overall, it can be stated that the campaign has laid the groundwork for an efficient EPI.

3) The immunization campaign reached 87% of the children under 5 years of age who had been located and registered in the channelling process. Slightly more than twice the number of children immunized every year were immunized in the three days of the campaign.

4) The concentrated effort devoted to the immunization campaign led to the solution of supply problems which might have taken several years to clear up had they been handled on a routine basis.

5) Various health regions, on their own initiative, have carried out mini-immunization days since the last national day on 21 April 1985—further evidence that the health services are keen to make systematic progress with EPI.

Research notes

- Immunizing with knowledge
- Communicating on immunization to mothers
- How mothers perceive immunization

Research notes

Immunizing with knowledge

The epistemology of traditional health theories: a neglected dimension in development

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> *The Masai homestead had been difficult to find as it lay hidden by the high savannah grass. When the young veterinarian, on his first mission to Africa, finally reached it, wet and exhausted from crossing the muddy river below, he rapidly explained his mission and asked: "Are there any questions?" The elders stared silently at the horizon for a long while as is customary. At last one of them ventured, "Yes,* ol-malimui *(teacher). Why did you not use the bridge?"*[1]

Many developing countries and the international community are rapidly increasing their efforts to achieve the goal of universal immunization adopted by the World Health Assembly in 1977. New technologies and low-cost approaches have since then made that goal seem possible to achieve. The most important new aspect is the realization that technology and financial resources will only be meaningful and effective if they become tools for the national mobilization of all actors. As the majority of these will be the people themselves, it is time to improve our understanding of their theories and attitudes to health and healing.

Assignment Children vol. no. 69/72, 1985

Community participation in social mobilization

Accelerated approaches aimed at national coverage are beginning to spread in certain key areas of primary health care, particularly immunization. They are backed in a number of countries by a very noticeable increase in political commitment at the highest levels of government. The key to the initial progress as well as to future achievements lies in the comprehensive social mobilization of all national resources: political, professional, popular, inside and outside of government, and inside and outside the field of institutionalized health management.

In order for such mobilization to become more than a short-lived national enthusiasm and a media fad, it must have its roots in true participation at all levels, not least the community level. Furthermore, it is important to view social mobilization not as a new and separate strategy initiated and maintained from the top, but rather as mobilization for improved and deepened participation particularly at the community level where the demands exist, whether these are articulated or not. Efforts to better understand what mobilization for development entails and how to improve the necessary dialogue and partnership needed between the professional and popular communities must therefore be intensified.

In this paper I shall attempt to contribute to these efforts by discussing the importance of the neglected dimension of knowledge and especially locally-based knowledge for participatory development. It is obvious, but still not fully realized, that development in health (as well as other sectors) will ultimately result from decisions made by people who are knowledgeable and experienced although their knowledge and experience differ from that of the sellers of outside development, the so-called development experts.

Neglect of traditional health knowledge in community participation research

The literature on experiences of participatory approaches to community health and primary health care is growing. The effectiveness, also in cost-efficiency terms, of such approaches aimed at mobilizing the people and striving to empower them to deal with their problems, is increasingly recognized. So far, studies of these movements within the public health arena have focused mainly on organizational aspects of how to involve people in planning and implementing health activities. Little, if any, attention is given to one of the most important aspects of participation, namely, how to understand and utilize the knowledge of health-related matters that exists in every culture and community.

There are many reasons for the neglect of this dimension. A dominant colonial tradition and the powerful outside "expert" cultures have labelled other people's knowledge as either superstition or ignorance. Furthermore, even for the serious-minded, it takes time to acquire such knowledge, and it may be difficult to obtain, as it is not usually shared by every individual in a community, and the traditional specialists who have it may not be eager to give it to outsiders. Be this as it may, without proper understanding and command of this knowledge, participatory approaches are destined to fail.

Some "outsider" approaches to traditional medical explanations

An analysis of etiologies and of what people themselves perceive as cause-related events is crucial for the study of how a body of knowledge and theory is generated, and for our understanding of the epistemological nature and quality of its components. All too often, however, the need for such a situational and generative approach to the study of popular medical theory and practice is ignored. Instead health- and disease-related ideas are presented as fixed beliefs, customs, superstitions and precoded behaviour. This type of approach emphasizes the difference, both formal and functional, between popular and scientific theories, and all too often has misrepresented the people's own etiological interpretation and obscured the true rationality and validity of popular health theories.

Another "scientific" bias helps to further blind the outsider. Apart from ethnocentrism there is an additional and more dangerous academico-centrism. Briefly, what is valued in scientific education and practice is a systemic approach which can reveal logical sequences and relationships. The Western scholar seems to go to great lengths to find a "system" where in reality there may only be a set of principles or ideas. This is seen in Rivers's pioneering studies as far back as 1924 and 1926,[2] and it dominated the debate until after World War II when a greater interest in "social and cultural change" developed.

The interest in the dynamics of change and adaptability of traditional health theories and health behaviour received the first real stimulus during the 1960s and 1970s, mainly from scholars with biology and/or ecology backgrounds.[3,4,5] However, most of these studies focused more on the "objective" biological or ecological factors behind the development of disease and the dynamics of such processes, and less on how diseases were perceived and dealt with by the society and its members.

Against this background, it becomes even more important to develop an action-focused analysis of disease etiologies and health theories in their different socio-cultural contexts, in order to understand and respect both the rationality and justification of the traditional/popular health approach, however different it may seem from the Western scientific tradition. It is also necessary if we are to be able to make use of the natural bridges that already exist for improved understanding.

Some dimensions of traditional health behaviour

Medical theories and practice outside the Western context are generally less sectored or compartmentalized than in the very specialized Western system. They are, as Young suggests, "more than a fiat of the Western medical paradigm".[6] Or as Peter Morley puts it: "The really fundamental sine qua non of medicine is that it is a social phenomenon and can only be understood as such. In traditional societies medical knowledge is far more closely integrated with the institutions and the all encompassing cosmology of the society as a whole, than is the case in more differentiated industrial societies".[7] In spite of the difficulties that this integration or embeddedness in local cultural thought processes and practices gives rise to, and in spite of high degrees of cultural variation, some patterns in epistemologies and practices can be generalized.

1. The nature of diagnosis and etiologies

Regardless of the "embeddedness" and other characteristics of traditional medical theory and practice, it is obvious that etiologies, diagnoses and practice similar or identical to Western medico-biological interpretations do exist. However, they do not exist in contradiction to a general body of theory and practice but as part of it. Any apparent contradictions between the two are, in my view, illusory and should be seen as projections by the observer rather than intrinsic to the traditional lore. Erasmus in his discussion of the evolution from "magic" to "science" points out that "the probability of knowledge is itself relative to the limitations inherent in a given cultural situation, and at no point in a progression is it 'better' except as measured by the value system of an observer at that point".[8]

The seeming contradiction between the two would appear to be the cause of endless misunderstandings and the basis for many of the allegations that traditional health practice is superstitious behaviour, inconsistent and unreliable. To illustrate and reduce such misunderstandings I will introduce two factors which are highly relevant for the understanding of the nature of different etiologies: *a)* the accessibility of empirical knowledge; and *b)* the relative social importance of the health problem. The latter has also been termed "the relative anxiety level".[9]

a) The problem of the accessibility of empirical knowledge in a "non-scientific" environment

To clarify my reasoning it is necessary to assume that an explanatory theory in any cultural context is based on data believed to be valid, and that it can be verified or falsified and has actually been verified. This assumption is necessary in order to understand behaviour, but does not contend that the data base must be the same or that the nature of proof for verification (or rejection) is the same everywhere.[10] It only implies that there are data and a process of verification which is culturally accepted.

This does not exclude the fact that certain observations of a biological nature are equally possible in any society, that biological knowledge of the same type is accessible, and that etiologies, diagnoses and practice tend to converge between cultures. [11] This is especially evident in the fields of bonesetting, orthopedics and obstetrics. In, for example, the Aleut culture, ample examples of their anatomical knowledge and its application are given in the literature. Sources of their knowledge were: *a)* the study of anatomical structures. Subsisting on fish, meat and fowl, they acquired a real familiarity with animal structures through disciplined observation; *b)* rational medicine and physical culture. They generalized from animal morphology and human behaviour, making use of their habits of observation and experimentation; *c)* dissection of human bodies. They dissected their dead to find out why they died and to become familiar with the internal anatomy; *d)* comparative anatomy. This was deliberately practised using the sea otter in particular; *e)* mummies. These were preserved for use as a source of knowledge. Inter alia, they practised acupuncture, blood-letting and blood-sucking, and massage, particularly of pregnant women. [12]

However, it is equally true that where such access to relevant biological knowledge is more complex, the differences between "scientific" and "ritual" etiologies become greater. One should not, however, overlook the fact that in the field of internal medicine, practical experiments over generations, for instance with herbal medicine, have often resulted in correct medical practice, although the etiologic explanations may be "ritual". [13]

b) The relative social importance of health problems (the anxiety factor)

Social importance in this context means the relative impact of a health problem on an individual's, or a group's, livelihood and social standing, either because of its immediate seriousness or because it is a chronic rather than an acute, passing phenomenon.

When an individual or a group is experiencing a health incident of minor consequence, the person or the group may be content to refer its occurrence to some observable event, e.g., "He broke his thumb falling off of a horse". This attitude may not be the case in a more serious situation which severely affects the individual or his group. Here the etiological analysis may focus on what is perceived as the "real" or the "primary" cause or the "cause of the cause" underlying the immediate observable event. This may be typically attributed to individual or collective breaches of important social rules or taboos,[14, 9] or to the power used by one person to harm another breaking the same rules (sorcery). In both cases spiritual powers may be seen to be the cause. It is therefore obvious that the diagnoses, etiologies and practice will differ considerably, depending on the importance of the problem or the "anxiety factor", even if the access to empirical knowledge is the same.

This point is helpful in understanding the frustrations often found among expatriate health personnel when they come into contact with what they perceive to be conflicting or discrepant behaviour, e.g., when children who are brought to a clinic or a hospital are withdrawn from such care and taken for treatment to traditional healers. Similar frustrations are often experienced when immunized children develop fever or other secondary symptoms and are taken out of the vaccination programme. What is perceived by the expatriate is a seeming discrepancy and contradiction with previous behaviour. What is not understood is that many symptoms of disease in an environment where infant and child mortality is frequent may be perceived as immediately life-threatening, generating high levels of anxiety, and result in protective drop-out behaviour.

Explanations may be found in the fact that continued health problems or the unexpected effects of treatment increase the social importance variable and also affect the anxiety level and thus the action variables. The social pressure in such a situation for certain, often traditional, forms of behaviour, is reinforced. Traditional diagnosis, etiology and practice may also have been internalized early in life, and the return to such strongly internalized knowledge and behaviour may alleviate anxiety.

In brief, it is important and helpful to remember the existence of such double programming, which can provide an explanation for the sometimes confusing oscillation in attitudes and behaviour in situations of rapid cultural change. Analysis of such behaviour can, as Miriam Were has effectively demonstrated,[13] be useful in trying to find bridges between the two cognitive contexts, and used constructively to prevent the negative consequences of oscillating behaviour.

2. *Health-related social roles*

The literature in medical anthropology and public health relating to Third World countries abounds in descriptions of healers, herbalists, witch-doctors and endless numbers of other ethnically specific health specialists. Such highly specialized roles certainly exist and are important. This does not, however, contradict what has been described earlier as "theoretical embeddedness", so well expressed by David Landy[15] when he describes a society's medical system as "the total organization of its social structures, technologies, and personnel that enable it to practise and maintain its medicine (as defined) and to change its medicine in response to varying intracultural and extracultural challenges".

I make this observation because I hold that, from the point of view of improved public health in Third World communities, it is important to look at and understand the total distribution of health-promoting roles and behaviour at all levels, particularly at levels which would allow the stimulation and empowering of people themselves to manage some of the most critical health problems facing them. Medical and especially public health research must focus increasingly not only on the health specialist, but on everyday health management by all members of society and on the knowledge and health behaviour of the patients.

Polgar[16] describes a similar concern when looking at the types of approaches common in public health-oriented work in the Third World. He depicts four fallacies which he found to be common in many programmes and studies:

1) the fallacy of the empty vessels, in which the subject populations do not have established health customs, and are empty vessels waiting to be filled with whatever health programme is being advocated;

2) the fallacy of the separate capsule, in which health beliefs and practices comprise a bounded, separate capsule of behaviour and cognition apart from the remainder of culture;
3) the fallacy of the single pyramid, which illustrates the assumption that information and behaviour changes would trickle down to the various parts of an assumed system;
4) the fallacy of interchangeable faces which assumes that all patients are alike.

Polgar's warnings are now, as well as then, well taken and give an indication of where research is still needed. Research at the non-specialist level is particularly important in order to arrive at a more reliable picture of the distribution of knowledge and of where remedial action is needed. A sharing of knowledge and ideas will then permit creative and relevant action to be undertaken.

Health for all, a two-way learning process

If we are to avoid replacing internal logic with paternalism and the mechanical absorption of the peoples of the Third World by Western technology into what Jamal[17] has referred to as a "mindless amalgam", knowledge must be shared. The external agents must also learn from the local communities. It has been made clear again and again that communities will strongly resist imposed knowledge and technology. As Andreas Fuglesang has pointed out: "The farmer's knowledge is experiential... He uses his knowledge like his hoe. He is in a sense not mentally aware of it. He is his knowledge. His knowledge is his self-image and his self-confidence as a community member".[1] To deny this knowledge is thus to undermine, even negate him as an individual and also the group to which he is a part; it is to wipe out the self-image and self-confidence of the communities which one wishes to assist.

On the other hand we also have a few examples which demonstrate the practicality and wisdom of learning from the people and their etiological explanations of health problems. Miriam Were's experience in Western Kenya[13] is a perfect demonstration of how successful this approach can be. Another example of the practicality of knowing the people one is working with is given by Mark Nichter[18] in a recent article on participatory research undertaken in India. During the course of the research, important information was found on cultural rhetorical styles. "It was noted that a popular means of establishing rapport and introducing new topics was by using analogy." Thus, emphasis was put not only on what people said about health, but also how they explained etiological events. This information was then put to use in developing a truly appropriate communications strategy whereby analogy was used to bridge "the experientially or conceptually known to the unknown".

In order to achieve such effective bridging and complementarity rather than separation and alienation, outsiders (government, expatriates, etc.) must be open-minded about the communities they are to work with and determined to avoid the dangerous pitfalls of both ethnocentrism and irrelevant academico-centrism. They must keep in mind that health and illness are part of life, of one's whole or total socio-cultural life experience, and not merely biological events which, in imitation of the Western model, have tended to be separated out and dealt with in a fashion isolated from the total life reality (e.g., mental health from physical health, biological events from social events, etc.). The communities' knowledge and the epistemology behind it must be understood. With time, this should enable mutual respect and trust between the two groups to be built up, thus allowing a two-way learning and synthesis of knowledge to occur, and in the long run, providing an increasingly firm basis for sustaining joint public health efforts.

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Research notes

Communicating on immunization to mothers and community groups

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Surprisingly, little research has been published on how to communicate immunization concepts to village mothers since the pioneering work in the early 1960s of Ransome Kuti, presently minister of health of Nigeria.

Priority efforts in EPI *have been directed towards logistics, the cold chain and vaccine improvement, and health educators have been more concerned with long-term health-related behavioural change.*

If health messages conveyed by the mass media are to be reinforced at the community level and a demand for immunization created, mothers have to understand causality in terms of their own cognitive scheme. In this research note, Miriam Were describes the need to build a bridge between different types of knowledge, to identify common areas of agreement as a condition for behavioural changes, to exchange views on causation in discussions with community groups, and to submit the scientific view as "another explanation" rather than "The explanation". The methodology of the "areas-of-agreement" approach is illustrated step by step as applied to the case of intestinal parasites.

The use of similes to convey the major immunization concepts that cannot easily be translated into the local language is illustrated by the banana leaf model, which the author used successfully with rural mothers when she was project director of the Kakamega project in Kenya.

Assignment Children, vol. no. 69/72, 1985

Changing attitudes on knowledge and ignorance

Fuglesang in his book *About understanding*[1] makes the point that "we see with our experiences". He also states, "we see with our attitudes". What we "see" with our experiences in the context of our attitudes is therefore the basis of what we understand from a situation or an encounter. It is also the basis of what we communicate. It used to be said that scientific investigation was always objective and "neutral", free from any bias. It is now widely accepted that the very choice of what is investigated is based on our experiences, attitudes and biases.

As recently as the 1960s, it was fashionable, at least in most professional medical circles, to plead helplessness in the face of the "astonishing lack of understanding" of village/rural people. The more one overplayed the game of ignorance ("I just cannot understand these people at all", stated with condescending sophistication), the more of an aura of professional importance one seemed to acquire. The only thing that might have beaten this is the professional who stated that he knew that the people knew nothing and therefore had to be "educated from the word go". One of the visible results of development work that recognizes pre-existing knowledge is that, in 1985, a professional taking this kind of stance would be the laughing stock of his audience. Most people would wonder what is wrong with the author of such a statement, rather than with the people he/she is referring to.

Inappropriate "bricks" in communication

The objects, concepts and usage of tools in people's lives form the basis of the language with which they conceptualize. I have been told in "high-powered conferences" that "primitive people cannot conceptualize". The question rather is what is conceptualized, to what end, and in whose interest. Professional workers in the modern sense have acquired certain tools for conceptualization in the context of their needs, and perhaps unconsciously assume that because they took so long to acquire those tools of conceptualization in formal institutional settings, those who have not gone through their experiences do not have any tools for conceptualization. It is as if not having their tools of conceptualization is the same as having no tools at all. Quite egocentric and ethnocentric, isn't it?

The very fact of existence implies problem-solving for survival. And if nothing else, people have conceptualized what enhances survival and what does not. They have, as it were, collected bricks with which they build their world. The issue really is not whether my tools are better than or superior to theirs. The important issue is that they have tools. Their bricks may be different from my bricks. But since the basic issue is first and foremost that of survival, there surely must exist some common bricks with which we begin to construct our concepts of how to survive, and concepts regarding what tends to threaten our survival. How successfully we communicate then depends on how well we can build with the bricks we have in common with our audience. In quite a number of discourses by professionals the need to "come down to the people's level" is often emphasized. Isn't this concept of coming down objectionable? Is it that easy to say who is up and who is down with respect to survival, when even those who are supposedly on the "safe side of survival" have adopted life-threatening lifestyles and amassed the means for human destruction? If coming down implies centring on reality, then that is good. But the way this term is used usually has the meaning of trying to accommodate the simplemindedness of simple people; cutting down on our brilliance in order to accommodate the low estate of their understanding. It is a condescending view, and those who are treated with this condescension usually realize it very quickly and "switch off". Then we, the professional workers, wonder what is wrong with them, since they are not developing as fast as we want.

It is quite revealing to see how the professional is sometimes perceived. At a discussion meeting in western Kenya, a professional worker concentrated on getting a point across to the elders. One of the elders came in when the discussion was in progress. He leaned across to the elder next to him and asked the older elder what had been said so far. The older elder looked at the younger elder with a bemused smile. "Do they ever say anything, these people? It is the usual noises they make." If we do not use the common bricks that exist between people in a mutually respectful manner, then it seems important that we realize that our communications are perceived as noises. The people must wonder what is wrong with us. An elder once described a graduate as "having wasted so many years and so much money and coming out without any understanding of life".

So how do we put behind us this stalemate and the condescending thought pattern that is implied in going down to the level of people, and rather recognize the existence of knowledge in all systems and look for common bricks—the areas of agreement? What are the common features in a given situation? Is it possible to go beyond cultural patterns and knowledge articulation to those areas of agreement in order to make a start in cases where the action to be taken makes sense to the actors in the decision? What are the areas of agreement, the existing similes for the concepts embodied in immunization that can contribute to the active involvement of people in protecting vulnerable populations from devastating but preventable diseases?

The areas-of-agreement approach

Reports in *Unresolved problems in PHC*[2] indicated that the agreement on health needs as identified by the people concerned on the one hand and by professionals on the other was of the order of about 70%. In the Kakamega project in Kenya (1977-1982)[3] it was found that this agreement was greater than 90%. In other words, what the people identified as their priority health problems was found to be very similar to what the professionals had identified. The diseases responsible for most childhood morbidity and mortality, such as diarrhoea, measles and other childhood problems, were given priority, followed by diseases related to reproduction and so on.

In view of the high level of agreement, it was interesting to examine why the level of compliance in health action by the professionals and by the people was as dismal as it was. Investigation of this disparity—i.e., high agreement in identifying problems but low compliance with respect to health action to solve the problem—brought out the fact that the disparity started with the perceived causes of the problem. The tendency was that once a problem was recognized by the people and the health staff, the health and other development workers immediately proceeded to expound on their understanding of the cause of the problem and present their solution, without paying any attention to how the people explained causation and how they would go about getting to the solution. In spite of the common bricks of perceiving the same problems as problems, the bricks were not used for building further understanding and establishing a rapport. Instead, the next step was that the groups slid back into "those who knew" and "those who didn't know" and needed to be taught. This became clear in discussions on the question of intestinal worms. This has been reported elsewhere,[3] and will be briefly presented here, only as an illustration of how the concept of areas of agreement helped to facilitate health action, the point being that the further the areas of agreement are extended, the greater the facilitation of action.

One of the operational strategies of the Kakamega project was an initial meeting at which the basic ideas of "people's participation in their own health care" were discussed. The "homework" of the project staff was to move from community to community discussing these ideas. The "homework" of the people was to identify and rank what they perceived as the problems they faced, which were then shared with the project staff. In the 92 project communities, health was rated as problem number one by most communities, and as number two by the others. The next stage of the people's "homework" was to rank their health problems, beginning with those they considered the most severe. This formed the setting for several possible routes of discussion on the problems presented and ranked.

One of the problems presented was intestinal parasite infestation, which the people connected with the "swollen bellies" of their children. Asked how they knew the problem was that of parasite infestation, they pointed out that they saw this in the fecal matter of the children. They also knew that when a child was given "worm medicine" at the health centre, many worms were expelled in the fecal matter and the abdomen "went down but did not always stay down". Sometimes it swelled again, and in due course they would see the worms in the fecal matter all over again. This recurrence created a cycle that seemed unbreakable.

During the discussions, the people were asked where the worms came from. They stated that everyone was born with worms. They linked abdominal noises in children and adults alike to the presence of worms. And the presence of worms was essential for life and good for survival. The people were asked why they presented intestinal parasitic infestation as a problem if people were born with worms and the presence of worms in the abdomen was essential for life. The explanation was that one is born with worms "in balance". This was not a problem but a good thing. Things became bad when the balance was disturbed and that which was good became bad.

On the face of it, this understanding could be laughed at and dismissed, as indeed has been the case over the years. But a "silent abdomen" is in fact consistent with a paralytic gut, which in the people's experience leads to death. Abdominal noises are therefore indicative of life, and those who have looked after newborns, as the people have done, know that movements in the abdomen are present from birth if a baby is healthy. In circumstances of near to universal infestation with worms, everyone in the long run expels worms in fecal matter. It is therefore not unreasonable to relate abdominal movements and noises to the worms that are seen to be expelled.

In the opinion of the project director, the perceptions were coherent, and discussion continued. The central issue then was what people perceived as "the thing" that disturbed the balance, tipping it from "good and essential for life" to "bad and life-threatening". Discussions on this issue alone took about three weeks. There were hints and muted remarks as to what disturbed the balance, but no clearly articulated statement. This could have been taken to mean that the people were incapable of articulating the cause of the problem. But it seemed from the whole system of discussion and communication that the issue was not one of ignorance, but of caution. When the factor that disturbed the balance was eventually stated, it was clear that there had been a need for caution. It was the understanding of the people that when worms had been expelled in fecal matter, "those with bad hearts and intentions" sneaked about to pick the worms from the fecal matter and "do magic on them". The witch doctors then used the "treated worms" to disturb the balance. Sometimes they supposedly did this by pointing a "treated" dried worm at the intended victim. Sometimes the witch doctor was believed to crush the "treated" dry worm into a powder, and then use the powder to "play magic".

The next obvious question was how to break the vicious circle. By this time, the hesitation that characterized the "pre-announcement period" of how the balance was disturbed was not so prominent. There was an air of relief and loud, even joyful sharing of views, with much laughter. Various "action alternatives" were considered, including getting rid of all witch doctors. This line of solution was perceived as impractical for legal reasons (the people knew they would be executed for murder if they committed it), religious reasons, and simple practical reasons. "You don't always know the witch doctor! Some of those who laugh with you are the ones who may want to destroy you", a woman elder said.

After the various options had been discussed, it seemed that the most practical solution was to make it impossible for the witch doctor to obtain the worms. And in the final analysis, the best way to ensure this was to dig a deep hole in each compound, i.e., a pit latrine. Latrine construction had been an issue over the years. It had been encouraged, even enforced, by the government through powerful chiefs. But even when constructed, they were "the chief's latrines" and not used, but kept to show him in order to escape any punishment he might mete out if they were not built. Sometimes they were the "Ministry of Health's latrines" and so on. In any case, there had always been only a handful of functional latrines. For even though "apparent latrines" may have been visible, functional ones were found in only 1 to 10% of households. If one didn't use a latrine, there was no need to worry about whether or not it was usable.

After this discussion and decision-making process, there followed what has been called an epidemic of functional latrine construction. Fecal matter was no longer visible in the bushes near homesteads and rivers. It was therefore an opportune time to deworm the population and address the initial problem of children with "swollen bellies", in the hope that the cycle had been broken.

In the case illustrated above, the areas of agreement were to be found in the identification and final solution of the problem. These areas of agreement formed a basis for action and an opportunity for establishing trust and rekindling the confidence of the people, for colonial systems have a way of leaving populations with shattered self-confidence.

A mutually respectful search

It may be necessary to state that the project staff did not simply listen and contribute to the planning of health action. The policy was always to find out what the people perceived as the source of the problem, and how they felt the problem should be solved. If the discussion went as far as it did in the case above, it was an indication that the people perceived that they were being taken seriously, and that the whole issue of jointly looking for a solution was not simply a "manipulative strategy", but a genuine, mutually respectful search. The project staff did not take what would have been the phony position of "we know nothing and you know it all". When the people had presented their side, the staff then presented their understanding. In this case, the presentation touched on the issue of forms of life invisible to the naked eye, but made visible by the use of a simple hand lens and perhaps a microscope. The explanation of eggs in the fecal matter as the means by which worms are spread was presented not as dogma, but as another explanation.

"Another explanation" instead of "The explanation"

Some medical colleagues get very worried if scientific information is presented as "another explanation" instead of "The explanation". In the Kakamega project, the motto was "Be simple without being dangerous". If a common practice, such as putting cow dung on the umbilical cord, was considered dangerous in the light of scientific information, this fact was presented to the people. But the element of choice was not taken away by turning professional workers into a police force to monitor people's practices. Another point of view was presented as logically as the people presented their views. For it became clear that whatever views the people presented, they had a very coherent sequence of explanation based on their experience. It may very well be that improvement of the quality of life through development work is so slow because those in charge "push through" a vote on a given issue without always presenting a coherent sequence of explanation.

Experiences in this project and others show that presenting "another explanation" has no disadvantage over presenting "The explanation". Sometimes "another explanation" may even have the edge, as it implies recognition of what is already perceived as an explanation by the people. People will choose the more viable solutions unless those presenting them demand impossible trade-offs in self-esteem and other costs, which make them unacceptable. Presenting "another explanation" or "another management" is not just a game with words and people's feelings. Explanations and management techniques change over time. And it is almost foolhardy to present "The explanation" or "The management" in absolute terms.

This author remembers that 30 or so years ago, childhood diarrhoea was traditionally treated by mothers in Isukha by boiling water with roots and making children drink the boiled mixture once it cooled. Then came a period of teaching sessions by social and health welfare workers. Mothers went to these sessions and were instructed to stop the "primitive practice" of giving water from boiled roots to children with diarrhoea. The management that was promoted then was withholding water and food; "complete rest for the stomach", including stoppage of breast-feeding. When rehydration, including oral rehydration, became the management of diarrhoea, health workers returned from surveys and in shocked presentations told of "this primitive African tradition of withholding water and food from children with diarrhoea". Now, who is primitive?

It can be quite confusing when the "custodians of knowledge" present a practice as the only correct one, and then, in the light of more facts, it is changed. It seems to be quite reasonable to present "another practice" in the awareness that one is simply offering a possible solution that has come to light.

The point here is that it pays to take the trouble to find areas of agreement between the various knowledge systems. Adopting new ideas is easier and more dignified if they relate to existing knowledge systems. There has been a tendency for development work to carry out what one observer sees as "development by destruction"—destroying the very object of the development targets. And then they turn around and wonder what is wrong with the people. Communication needs to be communication aimed at sharing and enhancing self-confidence and a sense of dignity in those whose quality of life is to be improved—that is, if the main objective is the development of the person, the people. But if "development" is a peripheral activity around other objectives, then "development by destruction" may very well be the path of choice, as the development of the people is not the issue, and might even be counterproductive in the eyes of those with other agendas.

Communicating an alternative solution in the absence of areas of agreement

There are times when, apart from the identified problem on which agreement is reached, there may be no other areas of agreement directly relating to explanations and the actions to be taken to remedy the situation. Such is the case when mothers identify children with reddened hair and swollen feet as being ill. The commonest explanations include the perception on the mother's part that this is a kidney disease, that it is a curse, or that it is due to body heat caused by another pregnancy. There seems to be no way of introducing food as the central factor in the problem. In this case, the approach familiar to this author is to ask the parent(s) to relate what they have done so far to try and get the child well. There is usually a long list of efforts, quite contrary to the reports of "doing nothing" that casual observers may present. When this long list of attempted efforts is given, the parent is then asked to give an assessment of the effect of all these actions on the child's health. The assessment may contain statements indicative of some improvement, but leaving a basically dismal picture. One can then present other ways in which such problems have been dealt with elsewhere, and recommend them to the mother/parents. This more cautious presentation may in the long run be more productive than "overselling" a management technique. For in the case of an individual child, it is never possible to guarantee survival. When a technique is oversold to the mother or to the community and death follows, the credibility lost may never be recaptured. If, on the other hand, the management proposed is presented as a practice used elsewhere and worth trying, even a death does not necessarily lead to lost credibility. On the other hand, a success provides the opportunity to explain the basis of the actions taken, which would include the factors that lead to the syndrome. The opportunity then arises of communicating the message that proper food is the medicine for some sick children.

Using a pre-existing simile to communicate a concept

Immunization concepts do not lend themselves to easy translation in the context of pre-existing health terminology. Speeches on immunization in a local language may have little meaning, because the words have been presented and not the concept. Presentations may have to use many borrowed words in the midst of the local language. Words commonly used in different languages, such as "thank you", are quite easily understood. But if one stands before an audience trying to explain "how to make icing for a chocolate cake", it is another matter. In many countries, the speaker would have to use the words "icing" and "chocolate cake" in the original language, and it would be practically impossible to communicate, due to the lack of common building bricks with non-cake-eating populations.

The same difficulty arises when one wants to communicate the immunization concepts of prevention, vaccine effectiveness and herd immunity, yet these are essential in an immunization programme.

It is important to communicate the concept of prevention before illness. Understanding and acceptance of this are crucial to the enormous effort that has to be made to carry children to immunization centres when they are still well. This has to make sense, as otherwise it would be seen as stupid and time-wasting to carry healthy children to health care facilities.

Concepts of vaccine effectiveness and take rates also need to be communicated, as there may be the occasional child who is known to have been immunized yet still contracts the disease. How does one communicate this in such a way as to avoid loss of credibility in the programme should a child nevertheless contract the disease?

The banana leaf model

It is not just a matter of translating the words or the sentence, but the whole concept and rationale. In areas where bananas grow, the banana leaf model provided a useful way of explaining the concepts when working with mothers and community groups.

Using the model to explain prevention…

One of the uses of the banana leaf is to protect against rain. If one is outdoors and notices any sign of rain, one plucks a banana leaf well in advance. If one waits until the raindrops come, one may be drenched in the process of getting the banana leaf, which will render it useless. To keep dry, the banana leaf must be obtained in good time. This is the way it is with immunization. Waiting until a child has signs of infection of the feared disease before having it immunized does not protect the child. It has to be done well ahead of time, just as a banana leaf is obtained before the first drops of rainfall. This simile was used to explain the need to immunize healthy babies.

… and vaccine failure

Even if one does get a banana leaf well ahead of the rain, there are occasions on which one may inadvertently pick a leaf with a hole or a tear, and the raindrops may still wet one's clothes. This does not mean that "banana leaves are useless in the rain", but simply that they don't always work 100% of the time. This simile was used to explain the concept of take rates; that not everyone who is immunized is fully protected. It was also used to explain why a whole cohort of children immunized in a particular month may still contract the disease, i.e., the problems of a bad batch. It was further used to explain problems of poor storage and poor administration to those who participate in immunization activities, so that they do not question the inherent value of immunization. The importance of good storage, transportation and administration is highlighted, because if there is a crack anywhere along the line, raindrops will slip through and the credibility of immunization will suffer. The simile was used to reassure mothers who had one child which had been vaccinated but still contracted the disease, so that they did not give up immunization for another child. One does not always pick the banana leaf with a crack. It was also used with those involved in the logistics and administration of vaccines to ensure that no cracks were present in the system, lest people lose faith in the importance of immunization.

... as well as herd immunity

Herd immunity is not necessarily an issue that is discussed with mothers or community groups. However, it often needs to be explained to those who participate in the immunization process, especially when the target is not 100% coverage. Does a programme that has 80% coverage as its target have a "deliberate policy of sacrificing" the remaining 20%? Is it because some people are not liked? This is a question that has been asked. How does one communicate simply the fact that immunizing 80% of the population is expected to contribute to protecting the other 20%?

The banana leaf model was used to explain that if there are a lot of people with banana leaves or umbrellas, the one person who does not have a leaf or an umbrella may be sheltered by other people's umbrellas or leaves. But if, on the other hand, all those with leaves or umbrellas are standing in one place, and those without in another place, then those without cannot be protected by those who have the leaf or umbrella. Protection for the person who does not have a leaf comes from mingling with those who do. Protection of the vulnerable few by the majority was effectively explained in this way. The danger of having pockets of children who are all unimmunized, and thus unprotected, can be visualized easily by means of this simile.

It is believed that this simile "brought the message home". For even in the absence of a mobile immunization service in the project, which meant that mothers had to walk up to 15 to 20 kilometres to take children to health centres, attendance nearly doubled between 1977 and 1980, and the number of children brought for immunization by their mothers quadrupled.

In conclusion, it is worth pointing out the important issues relating to going to scale and extending the Child Survival and Development Revolution strategies to nation-wide levels discussed in issue no. 65/68 of *Assignment Children*. Going to scale offers an opportunity to promote understanding of the issues at the personal, community and national levels, thereby contributing to a state of motivation based on understanding followed by demand, rather than on superficially based compliance. The march towards universal immunization could also be a march for development through confidence-building. For, as has been said before, development can only come from the people themselves. Appropriate communication approaches and styles that enhance confidence are also likely to enhance the capacity to work towards a better quality of life.

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Research notes

Bridging the communication gap

How mothers in Honduras perceive immunization

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Among the factors explaining why many children are not fully immunized, one of the most important, which to date has received little attention, is lack of understanding by mothers of both the concept and the practice of immunization. A field study was carried out in Honduras in 1983, prior to an extensive communication campaign, in which mothers were interviewed to ascertain their knowledge, attitudes and practices regarding immunization. Understanding of the concept of immunization was found to be at a low level; vaccination cards in particular were understood by few literate mothers, and illiterate mothers found them quite incomprehensible. This research note presents a summary of the findings of the study, which provided the basis for a multi-media educational strategy including the design of new vaccination cards based on visual codes easily understandable even by illiterate rural mothers.

Funding for this research was provided by the United States Agency for International Development through its

Assignment Children, vol. no. 69/72, 1985

Mass Media and Health Practices (MM&HP) and Health Sector I projects, and it was conducted by the Honduras Ministry of Health with technical assistance from the Academy for Educational Development (AED).

Mothers' perceptions of immunization

During an audience research study conducted from 12 to 26 September 1983 in the context of an immunization communication campaign, 275 rural mothers with children aged 3 years or under were interviewed to ascertain their knowledge, attitudes and practices regarding immunization.

Interviewers from the Honduras Ministry of Health found that mothers were aware that they should have their children immunized. This was the result of past campaigns and the efforts of health workers. Most mothers seemed to understand that immunization was important.

However, despite this positive attitude, full coverage was not being achieved, largely because in addition to the practical difficulties involved in having children immunized, rural mothers had many misconceptions regarding the concept and practice of immunization. Moreover, the survey brought to light a hitherto unsuspectedly low level of understanding of vaccination cards among both literate and illiterate mothers, with resulting repercussions on the level of coverage achieved by immunization programmes.

Practical difficulties in getting children immunized

The mothers interviewed highlighted a number of practical difficulties they faced in having their children immunized, most of which are common problems in rural areas in any developing country.

Many mothers lived long distances from vaccination posts or health centres, and on arrival, following a very long walk if they were unable to afford the cost of transport, would face a long wait in stifling heat before their child was attended to. Some mothers were unwilling to take such trouble if the child was well. At worst, the centre might not have vaccines available, or the cold chain might be broken due, for example, to lack of fuel to power refrigerators. On other occasions, mothers might find the health centre closed because the nurse was vaccinating children elsewhere, away sick, or at a training course, etc. Another problem arising in small centres is that vaccines are supplied in multiple-dose vials, and nurses are often reluctant to break into a vial for just one or two children arriving on a particular day, as once the pack is opened, the contents only remain usable for a very limited period.

At the family level, in some cases the father might not agree to the mother taking a child to a vaccination post. Her absence from the home for a whole day in the case of a distant post would leave him with no one to prepare meals. He might also argue that he himself had never been immunized and was nevertheless perfectly healthy.

Misconceptions regarding immunization

In addition to these practical obstacles, researchers found that mothers had numerous misconceptions as to what immunization means and how different vaccines are administered.

It was found that very few mothers understood the concept of immunization. Researchers discovered a total lack of understanding as to how vaccines work, as mothers had received absolutely no education on the subject. Some believed that immunization has a curative rather than preventive function, and even those who mentioned prevention did not know what this concept really meant.

The problem of immunizing sick children

Many mothers failed to bring their children for immunization if they were suffering from a slight illness. Under earlier regulations, nurses would not immunize children with low grade fever, and mothers and children would have to return at a later date. As a result of this practice, mothers began to take upon themselves the decision as to whether the child was well enough to be vaccinated in order to avoid an unnecessary journey. However, the mother's decision would not necessarily be correct. As international health research has demonstrated that immunization is effective even if children are mildly ill, health centre regulations were subsequently changed so that nurses now immunize children unless they are suffering from a serious illness.

Missed immunization dates

Some mothers did not realize that if they failed to take the child for immunization on the day they had been told, it would be possible to go back on a later date. Some believed that vaccines are not effective unless administered on fixed dates. Others were worried that they would be rebuked by health centre staff for missing the date specified.

Side-effects of the vaccines

An additional problem arose from children's reactions to immunization, such as fever. Many mothers were also found to be concerned about fever, believed to be a sign of serious illness. There is a widespread belief that unless treated, fevers may turn into bronchitis, pneumonia or, at worst, tuberculosis. Loss of working time through attending to a child's sickness represents a severe financial problem. Visits to health centres are costly in terms of both transport and lost working time.

The tuberculosis vaccine was not readily accepted. If not administered correctly, it can cause an abscess which may become infected if the child scratches it with dirty hands. The measles vaccine also upsets mothers, as children suffering from malnutrition and general weakness tend to present a strong reaction to it. Mothers were found to be aware that these reactions resulted from the vaccines themselves, but needed to be informed that such reactions are normal and shown how to deal with them, in order to avoid the risk of their bringing the child back late for the next dose or failing to return at all.

Lack of knowledge of age of immunization

Many mothers did not know at what age children should begin to be immunized, and even many of those who did know the correct age believed that infants of 2 or 3 months old were too small and delicate to be immunized.

Lack of understanding of vaccination cards

By governmental decree, registration at primary schools is subject to compulsory presentation of a vaccination card showing that the child has been immunized against polio, measles, diphtheria, pertussis, tetanus and tuberculosis.

Researchers found during the study that many mothers did not know whether their children had received the necessary doses of vaccines, yet the children's vaccination cards had been correctly filled in by nurses at the time of immunization. If mothers did not know which vaccines their children had received, nor how many doses, they could not know when their children had to be taken for immunization, nor how many doses were required.

For instance, some mothers believed that one dose of a vaccine was sufficient. This helps explain why early research showed that more children were brought for the first than for subsequent doses. By contrast, others believed that they had to take their children for immunization once a month for an indefinite period. Illiterate mothers had no way of knowing when their child's next injection was due if they forgot the date given by the nurse on the last visit. Most mothers were very careful to keep the vaccination card safe, however some lost their cards, not an uncommon problem as the conditions of rural life make it difficult to keep such documents safely, and were afraid of being rebuked by health centre staff.

Immunization practices were investigated at a number of different health centres. It was found that as there were long queues of children waiting their turn, the nurses did not have sufficient time to explain the vaccination cards, but simply read the card and administered the vaccine. The mothers were told only the date when the child was to be brought back for the next dose.

During the National Vaccination Week, the same researchers discovered that many of the children brought for immunization in fact were fully immunized. This indicated that the initial information campaign conducted on the radio and through graphic materials had successfully motivated mothers to bring their children, but in practice their lack of knowledge about the stage their children's immunizations had reached often led them to make unnecessary journeys.

Many mothers were interviewed at the health centres, and once again, as in the survey, it was found that few of them, literate or illiterate, understood the vaccination cards supplied by the Ministry of Health.

This lack of knowledge applied to every child in the family, and not even those mothers with children who had completed their immunization schedules were able to tell researchers, even by consulting the cards, what vaccines their children had received, how many doses of each had been administered, and how many more, if any, were needed to complete the full schedule.

A multimedia educational strategy

A multimedia educational strategy, including the use of radio messages and printed materials designed on the basis of the research team's findings, was launched to convey the concept of immunization and overcome some common misconceptions about it in the overall context of improving immunization coverage.

Radio messages

The following themes were stressed in radio messages prepared for use during the immunization campaign:

- even if your child is ill, take him to the health centre and let the nurse decide if he can be immunized;
- children must be taken to health centres even if they have missed their original immunization dates;
- a vaccine consists of several doses; your child should take all of them;
- secondary reactions to immunization are normal and can be managed easily.

Printed materials

A range of printed materials was also prepared for use in the campaign, including:

- a flipchart designed to explain the concept of prevention and increase knowledge regarding vaccines, to be used by health personnel in giving talks to mothers waiting for their children to be immunized or for other health services;
- a fold-out pamphlet for distribution to mothers at the time of immunization, which provided information on the diseases for which vaccines are available, their symptoms, transmission, vaccine dosage and recommended age of immunization, together with details of the reactions likely to be experienced by the child to some vaccines and instructions as to how to deal with them;
- a poster stressing the importance of children being fully immunized before their second birthday, to be put up in health centres, shops and other public premises.

Vaccination cards: an improved design

Perhaps the most important of the printed materials, in view of its wide distribution, was the vaccination card given to each mother as a record of her child's immunization status.

The use of radio was originally considered as a means of giving detailed information to mothers and explaining how many doses of each vaccine are required in order to ensure full immunity, and against which diseases children should be immunized.

However, the radio alone was not felt to be an adequate channel for the supply of this information; the vaccination card was considered to represent the ideal medium, as it contains the details the mother requires about her child's immunization history, and can be consulted whenever necessary.

The Ministry of Health vaccination card formerly used was not felt to be appropriate for this purpose, as it was designed more as a medical reference card than as an educational tool for mothers. In addition, some nurses were writing the dates in Roman numerals, making it difficult even for literate mothers to understand.

The Division of Education of the Ministry of Health designed a new vaccination card aimed at helping mothers understand better how many vaccines children need to receive, and how many are required to give full immunity.

Getting the message across to illiterate mothers

The main problem was that the new vaccination card had to be understandable by illiterate as well as literate mothers. In addition it had to be self-explanatory, as the nurses could not be expected to find the time to explain it in detail to each mother.

The aim was to find visual codes to illustrate:

- the vaccines administered;
- the necessary number of doses of each vaccine;
- the number of doses already administered.

This information would be complemented by nurses, who were already routinely informing mothers of the date they should bring the child back for the next shot.

Finding a visual communication code

Observations at health centres and interviews with mothers after their children had been immunized showed that they recognized the vaccine by the way in which it was administered:

- if given by mouth in the form of drops, it was the polio vaccine;
- if a deep injection into the arm, it was the measles vaccine;
- if a superficial injection into the arm, it was the tuberculosis vaccine;
- if an injection into the hip, it was the tetanus or pertussis vaccine (of the three diseases against which the DPT vaccine protects, tetanus and pertussis were the most easily remembered).

Putting the code on paper

The Ministry of Health graphic artist illustrated the methods whereby the various vaccines are administered in a way in which they would be easily recognized and understood. Colour was added to the drawings to make them more attractive. The necessary number of doses of each vaccine was shown by circles to be filled in when each dose had been administered, and the date of immunization was to be entered alongside the circle corresponding to the dose given. This system assured that sufficient space was given on the cards to each vaccine.

Card size

Once the problem of visual codes had been solved, the next decision to be made was the size of the cards.

Various vaccination cards were obtained from public (such as the Social Security Institute) and private institutions (such as a number of pediatric clinics and laboratories). It was found that those used by private institutions were four times as big as those used by the Ministry of Health, the reason given to researchers being that a larger card was less likely to be lost.

Nevertheless, the size of the ministry card had the advantage that mothers could carry it easily on their trips to health centres (women in the rural areas of Honduras typically carry their personal documents in plastic bags which they place inside their brassieres).

Pre-testing three versions of the card

Three different types of card were prepared for trial with rural women. The largest (version A) was a folded sheet containing simple pictures of the administration of the vaccines and circles showing the doses to be administered. When reduced to the ministry's card size this became a four-page booklet (version B), each page illustrating a different vaccine. The card originally used by the Ministry of Health (version C) was also taken for comparison with the others.

The trial analyzed separately each graphic design (identical in the case of versions A and B) and size, and the mothers were asked to choose which they preferred.

Mothers' reactions to the new card design

It was found that the combination of the simple message with illustrations showing the type of vaccine and circles indicating the number of doses greatly increased comprehension by literate mothers, and was absolutely decisive in terms of comprehension by illiterate mothers, who were able to understand fully both the purpose of the card and its contents.

The card used by the Ministry of Health was understood by none of the illiterate women, and even very few of the literate ones were able to explain the message it was intended to convey. In comparative tests, it was rejected by all the women interviewed.

The main difference between versions A and B was the size; the mothers preferred version B as it was easier to carry in their traditional way.

Their choice was also based on other advantages which came to light in the trial: it was easier for mothers to understand the message if only one vaccine was shown on each page.

Version B was adopted by the Ministry of Health on the basis of the survey, and 100,000 cards were printed (equivalent to 33% of the potential population requiring immunization annually).

Some proposed changes to the card

After almost two years of use, the Ministry of Health is now considering a more comprehensive card combining growth monitoring and diarrhoeal disease control messages with immunization records. Special attention will be given to several key lessons learned from this experience. Among the suggested changes are the following:

- eliminating the tetanus vaccine for pregnant women on the card, and replacing it with a promotional message about breast-feeding or ORT;
- eliminating the governmental decree on the mandatory nature of immunization on the back of the card, and replacing it with a message about children's growth and nutrition or family planning;
- changing the graphics to emphasize the vaccine-preventable disease rather than the form of vaccination administered;
- adding a clear visual symbol for immunization completeness.

Conclusions

The survey of rural mothers highlighted some important aspects of how mothers perceive immunization, and what problems are involved in putting across the message, in particular to the rural community.

When educational materials are designed, account must be taken of the differing needs of urban and rural dwellers and of the literate and the illiterate. As became very clear from this study, equal priority should be given in every case to comprehension by users as to the convenience of health personnel.

Graphic materials should be based on visual codes aiding comprehension by the illiterate. In the context of immunization, for example, if vaccination cards are easily understandable they represent an additional channel through which the necessary information about the various kinds of vaccines and the doses of each required to give immunity may be given.

An important conclusion to be drawn from the study is that the control records or cards used in some health programmes, if suitably designed, can be used as educational channels for patients attending health centres.

No programme can be fully effective in the long term if its purpose and the way in which it operates are not fully understood by the target population. If misconceptions such as those found in this research regarding immunization are to be avoided, educational and similar material should be designed to take account of the cultural, social and educational background of the actual users and pre-tested with them. The key lesson here is to transfer control of the immunization process to mothers by empowering them with the information needed to seek out the service, monitor its effects and overcome the practical obstacles.

Glossary

Immunization glossary

Antibody	Most infections leave a person protected for some time against a second attack of the disease because the micro-organisms causing the infection have stimulated the body to produce antibodies. Antibodies are special proteins in the blood which inhibit the organisms or toxins causing the disease. Those antibodies which inhibit the action of toxins are called antitoxins. The sites of maximum antibody formation are the lymph nodes and spleen.
Maternal antibodies	Antibodies produced by the mother and transmitted to the fetus through the placenta or colostrum (see passive immunity).
Antigen	A substance which, when introduced into the body, stimulates the production of antibodies. Viruses, bacteria, bacterial toxins, red blood cells, tissue extracts, pollens, dust and many other substances may act as antigens.
Antitoxin	See antibody.
Booster dose	The word "booster", which originated in colloquial speech, means "reinforcing", "augmenting" or "supplementing". Some vaccines have to be given several times at intervals of at least four weeks to achieve an adequate level of protection. These first doses of the vaccine (in the cases of DPT—diphtheria, pertussis and tetanus—and oral polio vaccine three doses are given) are called the primary series. It is advisable to give an additional dose (booster dose) after some months or years to maintain adequate protection. For example, the primary series of tetanus toxoid in pregnant women comprises two doses, the sec-

	ond being given four weeks after the first. A third dose (booster) administered during a subsequent pregnancy or the following year protects all babies born within a period of at least five years.
Control of a disease	A significant reduction in the number of new cases of a disease resulting from activities carried out by health authorities to check its spread, so that it no longer constitutes an important public health problem. These activities include case finding and treatment, immunization, reduction in contacts with vectors and surveillance.
Droplet infection	An infection transmitted through tiny drops such as small particles of respiratory secretions which are expelled by coughing, sneezing or speaking and suspended in the air. Evaporation causes them to reduce into small particles which remain in the air for a long time, and thus transmit the microbial disease from one person to another.
Endemic	The constant presence of cases of a disease or infectious agent within a given community or region.
Epidemic	This is the situation in which the number of cases of a disease in a community increases well above the usual level. The number of cases constituting an epidemic depends on the size and type of the community, its previous experience of the disease and the nature of the infecting agent.
Eradication of a disease	This is the situation in which no new cases occur because of activities designed to eliminate the vectors or agents and to render all cases non-infective. The transmission of the disease is therefore stopped. The term "elimination" is preferred when the geographical area concerned is limited. "Eradication" is generally understood to refer to the global

	level. Smallpox is the only disease that has so far been eradicated from the world; concerted international action led to its disappearance by 1977.
Gamma globulin	This product is a concentrate of antibodies derived from human or animal blood. It can be used to prevent or lessen the effects of measles, hepatitis, yellow fever, tetanus and mumps. Its use is restricted by cost and by its limited protective effect (two to six months).
Immunity	Immunity is the state of resistance of the body to agents foreign to it. Immunity does not necessarily mean complete lack of susceptibility; varying degrees of immunity are recognized (nil, partial or complete) which result in susceptibility, latent infection (or healthy carrier state) or insusceptibility. Immunity may be natural, actively acquired or passively acquired.
Active immunity	Active immunity is acquired by contracting an infection (natural active immunity) or by administration of vaccines (bacterial, viral and toxoidal) either singly or in suitable combination. The person who contracts the infection or is immunized makes his/her own antibodies which remain in the body for a long time. This is the most desirable form of immunity; it is lost very slowly and, where appropriate, can be rapidly restored by a booster dose.
Passive immunity	In the case of passive immunity, ready-made antibodies are acquired by infection or injection (e.g., gamma globulin). Passive immunity is transmitted from mother to fetus through the placenta or colostrum (e.g., neonatal tetanus can be prevented by administering tetanus toxoid to the mother). Passively acquired antibodies give short-term protection, usually lasting only two to six months.

Herd immunity

This is the situation in which susceptibles (non-immune subjects) are protected from a disease if a sufficient proportion of the community has become immune either through natural infection or through being immunized against that disease. Such protection is acquired because the probability of a susceptible coming into contact with the disease is greatly reduced. However, even when the level of herd immunity in a community is very high, susceptibles who do come into contact with the disease may obviously still contract it.

The current interest in the concept of herd immunity is due to its usefulness in immunization programmes for estimating the minimum coverage which would lead to the control of a given disease in a given community (i.e., a considerable reduction in the number of cases for long periods) or even its elimination (i.e., the complete cessation of transmission of the disease).

There is a relationship between the level of herd immunity and the characteristics of the particular population or community, the infectious bacterium or virus, and social and environmental factors.

An important determinant of the level of herd immunity is the nature of the infecting agent, specifically its mode of spread and the duration and degree of contagiousness. Since measles is the most contagious of the EPI diseases, its control requires the highest level of herd immunity. Herd immunity is not applicable to tetanus since the bacillus is not directly transmitted from person to person or through vectors, and tetanus infection does not confer immunity.

Other significant determining factors are population characteristics, including the size, composition and density of the population, the birth rate (i.e., the rate at which new susceptibles enter the community), and mobility within the community. A higher level of

	herd immunity is required in a densely populated urbanized area in a developing country or a high-birth-rate area than in scattered rural settlements or areas with low birth rates. There are thus no fixed levels of herd immunity applicable to the EPI diseases, since these depend on the mix of the various conditions relating to the population, the disease and the physical and social environment. The ideal is to have every child protected by being fully immunized. In EPI programmes, an 80% average rate is often taken as a working minimal level for all the vaccines. Such a coverage rate might produce an adequate level of herd immunity for most of the diseases, depending on the various parameters described above, with the exception of measles, which probably requires well over 90% coverage in most communities. The practical implication of the concept of herd immunity in developing countries is that immunization programmes must achieve very high coverage rates and incorporate a good system of disease surveillance to judge their effectiveness. This is the prerequisite if the vaccine-preventable diseases are to be controlled (and some possibly eradicated).
Incidence	The number of new cases of a health problem in a defined population during a given time period. Incidence is expressed as an absolute number (e.g., 30 cases). The incidence rate is a measure of frequency of new cases of a disease in a defined population during a given time period, usually a year. It is expressed as the number of new cases per 1,000 or per 100,000 of the population.
Jet injector	This is an apparatus which projects fluid in a thin, high-speed jet which has enough force to penetrate the skin without requiring the use of a needle. Models which are cocked by

	means of a foot pump are used in mass programmes. As many as 1,000 persons an hour can be immunized, although in practice average figures are lower, due to difficulties in organizing immunization sessions. Hand-cocked models are also available, but are restricted to intradermal injections and generally intended for office use. Operators of jet injectors must be well trained. In mass programmes, reserve injectors and an adequate supply of spare parts are required. The measles, DPT and yellow fever vaccines can be administered by jet injector. BCG can also be administered in this way, but because of the variability of the dose delivered and of its placement in the skin, WHO prefers the use of a syringe and needle.
Prevalence	The number of all cases of a disease existing in a defined population at a specific point in time. Prevalence is expressed as an absolute number (e.g., 3,000 cases). The prevalence rate is a measure of the frequency of all cases of a disease existing in a defined population at a specific point in time. It is expressed as the number of cases existing per 1,000 or per 100,000 of the population.
Seroconversion	Seroconversion studies assess the presence or absence of specific antibodies in the blood of children or adults following immunization or natural infection. Such studies allow calculation of the proportion of the population who are seropositive (i.e., have protective antibodies against a given infectious disease) or seronegative (i.e., do not possess such antibodies).
Toxoid	Some bacteria cause illness by producing substances (toxins) which act at a distance from the site of infection. In neonatal tetanus, the umbilical cord is usually the site of infection, but the toxin produces generalized effects on the muscles of the body.

	Toxoids are toxins modified by the application of chemicals such as formaldehyde, which destroy their ability to cause disease without affecting their capacity to produce antibodies. The diphtheria and tetanus vaccines are toxoids.
Live attenuated vaccines	Live vaccines contain live bacteria or viruses. These organisms are treated in the laboratory to minimize their harmful effects while retaining their ability to stimulate the production of protective antibodies. Examples include BCG, oral polio (Sabin), measles, rubella, mumps and yellow fever vaccines. In their liquid state, live vaccines may be inactivated by heat or even by strong light. Vaccine stability can be improved by freeze-drying, a process in which the vaccine is reduced to a powder by freezing and removing water vapour under vacuum. Freeze-dried vaccines are reconstituted before use with a diluent, commonly distilled water or saline. The diluent should be at a temperature of between 0°C and +8°C at the time of reconstitution.
Whole inactivated vaccines	Dead or killed vaccines are made from killed bacteria or viruses. DPT vaccine contains dead pertussis bacteria and diphtheria and tetanus toxoids. Other examples are the cholera, typhoid, polio (Salk) and influenza vaccines. Killed vaccines are less heat-sensitive than live vaccines.
Inactivated bacterial toxins/toxoid vaccines	Examples are the diphtheria and tetanus toxoids.
Vaccine efficacy	This is a measure of the degree to which a vaccine protects the members of the community in which it is used. A comparison is made between the attack rates (i.e., the number of

cases occurring per 100 of the defined population) in those who have been immunized, as against the non-immunized population.

Example:

Number immunized	I
Number not immunized	U
Cases in the immunized population	Ic
Cases in the non-immunized population	Uc

$$\text{Vaccine efficacy (V.E.)} = \frac{\frac{Uc}{U} - \frac{Ic}{I}}{\frac{Uc}{U}}$$

If $I = 2{,}000$ persons
$U = 200$ persons
$Ic = 15$ cases
$Uc = 10$ cases

$$\text{then V.E.} = \frac{\frac{10}{200} - \frac{15}{2{,}000}}{\frac{10}{200}} = 0.85 \text{ or } 85\%$$

In practice, vaccines are never either wholly effective or totally ineffective. Measles vaccine, administered correctly, is 80 to 95% effective. Studies on the clinical efficacy of vaccines provide useful information. They can assure health care providers that a vaccine is highly effective and contribute to building confidence in vaccination. If efficacy is lower than expected, the vaccine management and vaccine administration techniques should be carefully evaluated.

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The final version was reviewed with WHO/EPI.

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Articles on immunization published in recent issues of *Assignment Children*

The Expanded Programme on Immunization, the 1982 resolution by the World Health Assembly,
no. 61/62, 1983, pp. 119-120.

The EPI five-point action programme, Resolution WHA 35.31, 14 May 1982,
no. 61/62, 1983, pp. 121-122.

Recent progress in immunization,
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Third World/ Students	$ 1.80/FF 6	$ 4.25/FF 17	$ 7.50/FF 30
Europe	FF 8.50	FF 23	FF 46
USA, Canada, Australia, New Zealand	$ 2.50	$ 8	$ 16.00

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Assignment Children
UNICEF, Palais des Nations, 1211 Genève 10, Suisse

Printed in Switzerland Imprimerie Corbaz, Montreux

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